

# 38th Annual Meeting of the Surgical Research Society of South Africa

Hosted by the the Department of Surgery, Walter Sisulu University, 15 - 16 July 2010, East London

EFFECTS OF TRANEXAMIC ACID ON DEATH, VASCULAR OCCLUSIVE EVENTS, AND BLOOD TRANSFUSION IN TRAUMA PATIENTS WITH SIGNIFICANT HAEMORRHAGE (CRASH-2): A RANDOMISED, PLACEBO-CONTROLLED TRIAL

M. C. M. Modiba

*University of Limpopo (Medunsa campus)*

**Background:** Tranexamic acid can reduce bleeding in patients undergoing elective surgery. We assessed the effects of early administration of a short course of tranexamic acid on death, vascular occlusive events, and the receipt of blood transfusion in trauma patients.

**Methods:** This randomised controlled trial was undertaken in 274 hospitals in 40 countries. 20 211 adult trauma patients with, or at risk of, significant bleeding were randomly assigned within 8 hours of injury to either tranexamic acid (loading dose 1 g over 10 min then infusion of 1 g over 8 h) or matching placebo. Randomisation was balanced by centre, with an allocation sequence based on a block size of 8, generated with a computer random number generator. Both participants and study staff (site investigators and trial co-ordinating centre staff) were masked to treatment allocation. The primary outcome was death in hospital within 4 weeks of injury, and was described with the following categories: bleeding, vascular occlusion (myocardial infarction, stroke and pulmonary embolism), multi-organ failure, head injury, and other. All analyses were by intention to treat. This study is registered as ISRCTN86750102, Clinical trials.gov NCT00375258, and South African Clinical Trial Register DOH-27-0607-1919.

**Findings:** 10 096 patients were allocated to tranexamic acid and 10 115 to placebo, of whom 10 060 and 10 067, respectively, were analysed. All-cause mortality was significantly reduced with tranexamic acid (1 463 (14.5%) tranexamic acid group v. 1 613 (16.0%) placebo group; relative risk 0.91, 95% CI 0.85 - 0.97;  $p=0.0035$ ). The risk of death due to bleeding was significantly reduced (489 (4.9%) v. 574 (5.7%); relative risk 0.85, 95% CI 0.76 - 0.96;  $p=0.0077$ ).

**Interpretation:** Tranexamic acid safely reduced the risk of death in bleeding trauma patients in this study. On the basis of these results, tranexamic acid should be considered for use in such patients.

## REFERENCE

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THE IMPACT OF COUNTRY AND CULTURE ON END-OF-LIFE CARE FOR INJURED PATIENTS: RESULTS FROM AN INTERNATIONAL SURVEY

C. G. Ball<sup>1</sup>, P. H. Navsaria<sup>2</sup>, A. W. Kirkpatrick<sup>3\*</sup>, C. Vercler<sup>4</sup>, E. Dixon<sup>3</sup>, J. Zink<sup>4</sup>, K. B. Laupland<sup>3</sup>, M. Lowe<sup>4</sup>, J. P. Salomone<sup>4</sup>, C. J. Dente<sup>4</sup>, A. D. Wyrzykowski<sup>4</sup>, S. M. Hameed<sup>5\*</sup>, S. Widder<sup>6\*</sup>, K. Inaba<sup>7</sup>, J. E. Ball<sup>3</sup>, G. S. Rozycki<sup>4</sup>, S. P. Montgomery<sup>8</sup>, T. Hayward<sup>1</sup>, D. V. Feliciano<sup>4</sup>

*Departments of Surgery, <sup>1</sup>Indiana University, Indiana, IN, USA; <sup>2</sup>University of Cape Town, Cape Town, South Africa; <sup>3</sup>University of Calgary, Calgary, AB, Canada; <sup>4</sup>Emory University, Atlanta, GA, USA; <sup>5</sup>University of British Columbia, Vancouver, BC, Canada; <sup>6</sup>University of Alberta, Edmonton, AB, Canada; <sup>7</sup>University of Southern California, Los Angeles, CA, USA; <sup>8</sup>Walter Reed Army Medical Center, Washington, DC, USA*

**Background:** Up to 20% of all trauma patients admitted to an intensive care unit (ICU) die from their injuries. End-of-life decision making is a variable process that involves prognosis, predicted functional outcomes, personal beliefs, institutional resources, societal norms and clinician experience.

**Aim:** The purpose of this study was to better understand end-of-life processes following injury by comparing clinician viewpoints from various countries and cultures.

**Methods:** A qualitative, physician-based, 38-question international survey was used to characterise the impacts of medical, religious, social, and system factors on end-of-life care following trauma.

**Results:** A total of 419 clinicians from the USA (49%), Canada (19%), South Africa (11%), Europe (9%), Asia (8%) and Australasia (4%) completed the survey. In the USA the admitting surgeon guided most end-of-life decisions (51%) when compared with all other countries (0 - 27%). The practice structure of US respondents also varied from other regions. Formal medical futility laws are rarely available (14 - 38%). Ethics consultation services are often accessible (29 - 98%), but rarely employed (0 - 29%) and typically unhelpful (<30%). End-of-life decision making for patients with traumatic brain injuries varied extensively across regions with regard to the impact of patient age, GCS, and clinician philosophy. Similar differences were observed for spinal cord injuries (age and functional level). The availability and use of 'donation after cardiac death' also varied substantially between countries.

**Conclusions:** This is the first large study to compare the impact of geographical differences in religion, practice composition, decision-maker viewpoint and institutional resources on end-of-life care after injury. These disparities reflect competing concepts (patient autonomy, distributive justice, religion).

## FACTORS DETERMINING THE MORTALITY AND MORBIDITY IN ACUTE DIAPHRAGMATIC HERNIA AS A RESULT OF BLUNT OR PENETRATING TRAUMA AT DR GEORGE MUKHARI HOSPITAL

**N. Raoleka, M. C. M. Modiba**

*Department of General Surgery, Dr George Mukhari Hospital and University of Limpopo*

**Aim:** Traumatic diaphragmatic hernia is a clinical presentation that may be difficult to diagnose and can easily be missed. The aim of this study is to describe the prevalence and distribution of acute diaphragmatic hernia as a result of blunt or penetrating injuries among patients in the North West province, presenting at Dr George Mukhari Hospital, to establish factors determining mortality and morbidity in these patients and to elucidate the current clinical approach, which has proven to be a challenge, with the aim of contributing to the improvement in making a diagnosis and correct management in this group of patients.

**Methods:** Data were from clinical records of 28 patients presenting at the Dr George Mukhari Hospital casualty department between 2007 and 2010, diagnosed with acute traumatic diaphragmatic hernia as a result of blunt or penetrating trauma with the aid of a chest radiograph with or without a nasogastric tube or computed tomography (CT) scan, or intra-operatively. Demographic information such as date of injury, referring hospital, gender and age were recorded. The mode of injury, clinical picture at presentation, use of nasogastric tube with the chest radiograph, and pre-operative and postoperative management were recorded.

**Results:** Based on the initial chest radiograph, the diagnosis was missed in 16 of the 28 patients with traumatic diaphragmatic hernia. The female-to-male ratio was 1:1.8. The mean age was 33 years (range 17 - 67 years). Eleven patients sustained penetrating injury to the left lower chest and 17 sustained blunt thoraco-abdominal injury. Forty-seven per cent of patients who sustained blunt abdominal injury were unstable at initial presentation, with 35% requiring ICU management. In 14 patients the initial chest radiograph was done without a nasogastric tube *in situ*; this aided in diagnosis in 9 patients. A non-therapeutic intercostal drain was inserted pre-operatively in 15 patients.

**Conclusion:** The data confirm that the diagnosis of traumatic diaphragmatic hernia is a challenge, and that in blunt thoraco-abdominal trauma and penetrating chest trauma surgeons should always view the initial chest radiograph with a high index of suspicion for traumatic diaphragmatic hernia. A nasogastric tube should be inserted with the initial chest radiograph as it yields a high rate of diagnosis, and hence avoids insertion of non-therapeutic intercostal drains, which may injure bowel and predispose patients to complications such as empyema thoracis.

## DOES IT REALLY NEED A DRAIN? A CONSERVATIVE APPROACH TO SMALL TRAUMATIC PNEUMOTHORAX

**T. Ribbons, P. Hargovan, G. V. Oosthuizen, D. L. Clarke, S. R. Thomson**

*Metropolitan Trauma Service Pietermaritzburg and Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal*

**Introduction:** Conservative management of small traumatic pneumothoraces has been advocated by some authors. In our institution, it has become routine practice to attempt conservative management of small pneumothor-

aces. This audit looks at the outcome of conservatively treated traumatic pneumothorax in a busy regional hospital.

**Methods:** A prospective audit of all patients admitted to the trauma ward with a diagnosis of pneumothorax over a 3-month period. The guideline in our hospital was that all patients with small (<2 cm) pneumothoraces should be managed conservatively, with admission for observation and repeat chest radiography in the first instance, unless the patient was in respiratory distress or about to undergo mechanical ventilation.

**Results:** 39 patients were admitted with a diagnosis of traumatic pneumothorax. Of these pneumothoraces 37 (94.8%) were visible on plain chest radiograph, and 2 (5.2%) were occult, visible only on CT scan; 14 patients (35.9%) had a pneumothorax <2 cm, of which 11 were initially managed conservatively. Ten (90.9%) of these 11 patients were successfully discharged home the next day after a repeat chest radiograph showed no further enlargement of the pneumothorax. None of these patients represented or required readmission from their 2-week follow-up appointment. One patient initially managed conservatively had a repeat chest radiograph showing enlargement of the pneumothorax, which required intercostal drainage.

**Conclusion:** A conservative approach to small traumatic pneumothoraces is safe and effective.

## IS PHYSICAL EXAMINATION RELIABLE IN IDENTIFYING SERIOUS PATHOLOGY FOLLOWING THORACIC TRAUMA, AND WHAT DOES THE ROUTINE CHEST RADIOGRAPH ADD?

**T. Ribbons, P. Hargovan, G. V. Oosthuizen, D. L. Clarke, S. R. Thomson**

*Metropolitan Trauma Service Pietermaritzburg and Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal*

**Introduction:** The diagnosis of major thoracic injury is usually made by a combination of physical examination and imaging studies. However, in our institution access to even basic radiology may be logistically complicated. This has led to the practice in some cases of treating patients on clinical grounds alone. This audit looks at the accuracy of physical examination in predicting significant thoracic pathology following thoracic trauma in a busy regional hospital.

**Methods:** A prospective observational study of all patients admitted to the trauma unit with a diagnosis of chest trauma over a 3-month period. Patients transferred directly to theatre prior to imaging studies were excluded. Information on mechanism of injury, vital signs on presentation, clinical findings, initial clinical diagnosis, radiological diagnosis and management plans were collected. Outcome measures were: (i) radiological diagnoses matching the clinical diagnosis; and (ii) changes in the management plan based on radiological findings.

**Results:** 117 patients were included in the study. In 48 cases (41.0%) the physical examination findings matched the radiological diagnosis. In 39 cases (33.3%) the radiological findings altered the management decision. Changes in management plan included: insertion of a chest drain (24), not inserting a chest drain indicated to be necessary according to physical examination (6), and admission for observation and further imaging (9, of whom 2 went on to urgent thoracotomy following a positive ultrasound scan for pericardial effusion).

**Conclusion:** Physical examination in thoracic trauma is grossly inaccurate, and may lead to both overtreatment and undertreatment if used in isolation. Confirmatory imaging studies are essential.

## DAMAGE CONTROL LAPAROTOMIES AT A LEVEL 1 TRAUMA UNIT: WHAT FACTORS COULD PREDICT INITIAL OUTCOME?

**R. du Toit, J. Goosen, M. Moeng, G. P. Candy**

*Department of Surgery, University of the Witwatersrand, Johannesburg*

**Background:** Patients undergoing damage control laparotomies have sustained immediately life-threatening injuries and require resuscitative surgery. The decision to employ damage control surgery is frequently delayed, potentially increasing mortality.

**Aim:** To obtain a profile of the average non-survivor and survivor during the initial 24 hours after damage control surgery.

**Methodology:** Retrospective review of damage control laparotomies recorded on the trauma registry of C. M. Johannesburg Academic Hospital Trauma Unit (1 May 2005 – 31 December 2005).

**Results:** Gunshot wounds were the most common mechanism of injury in both groups. 100 (55%) of a total of 181 patients survived damage control laparotomies for 48 hours.

Parameter	Non-survivors (N=81)	Survivors (N=100)	p
Age (yrs)	31.5±10.1	32.2±10.3	0.63
Pre-hospital time (min)	27.5±23.5	31.4±23.4	0.15
Resuscitation			
Temperature (°C)	36.1±1.4	36.6±1.0	0.051
pH	7.27±0.0.18	7.35±0.09	0.0010
Base deficit	-7.2±5.7	-5.0±5.6	0.0273
Lactate	8.5±4.2	6.5±2.9	0.0162
Colloids (median)	1 000 ml	500 ml	0.0115
Revised Trauma Score	5.6±2.3 (6.4)	6.8±1.5 (7.6)	0.0002
Theatre			
Temperature (°C)	33.1±1.7	34.7±1.5	<0.0001
pH	7.03±0.16	7.22±0.10	<0.0001
Base deficit	-17.4±4.6	-9.3±4.4	<0.0001
Fluids (median):			
Colloids	2 000 ml	1 500 ml	<0.0001
Blood	7 000 ml	5 000 ml	<0.0001
Injury Severity Score (ISS)	31.2±8.5	23.6±8.5	<0.0001
Probability score ISS	0.65±0.39	0.88±0.22	<0.0001
New ISS	38.0±11.0	46.9±11.0	<0.0001

**Conclusions:** Emergency room parameters that significant predicted mortality, and possibly the need for damage control surgery, were pH, base deficit, lactate, and Revised Trauma Score. Intra-operative parameters that significantly predicted mortality were temperature, metabolic acidosis, and volume of colloid and/ or blood transfused. These parameters could improve intra-operative decision-making.

## VARIATIONS IN LEVELS OF CARE PROVIDED INSIDE A HOSPITAL TO ACUTE TRAUMA PATIENTS

**W. W. D. Stewart, Z. Farina<sup>1</sup>, D. L. Clarke,<sup>2</sup> S. R. Thomson<sup>2</sup>**

*Metropolitan Surgical Service and <sup>2</sup>Metropolitan Anaesthetic and <sup>1</sup>Critical Care Service, Pietermaritzburg, and Nelson R Mandela School of Medicine, University of KwaZulu-Natal*

**Introduction:** Caring for trauma patients is a dynamic process, and it is often necessary to move the trauma patient around the hospital to different locations. This study attempted to document the quality of observations performed on acute trauma patients as they moved through the hospital during the first 24 hours of care.

**Methodology:** This study was a student elective and was undertaken at Grey's Hospital in Pietermaritzburg. A third-year medical student was assigned to follow acute trauma patients throughout the hospital during the first 24 hours following admission. This single independent observer recorded the frequency with which vital signs were recorded at each geographical location in the hospital for each acute trauma patient. A scoring system was devised to classify the quality of the observations that each patient received in the different departments. The observer recorded all the geographical movements each patient made during the first 24 hours of admission.

**Results:** Fifteen patients were recruited into this study over a 4-week period. There were 14 adult males (average age 28 years, range 18 - 56) and a 7-year-old girl in the cohort. There was great variability in the quality of the observations each patient received during the first 24 hours in our institution. There were significant differences in the quality of the observations depending on the geographical location in the hospital. These variations and differences were consistent in certain locations and highly variable in others. Uniformly excellent observations were delivered in the ICU and the operating theatre. In the radiology suites the level of observations was universally poor. In casualty and the wards there was great variability of the level of observation. There were a total of 45 distinct geographical patient visits in the study cohort. Each patient made an average of 3 (range 2 - 5) distinct geographical visits during their first 24 hours after admission. All patients attended casualty. There were 11 patient visits to the ward, 10 to radiology, 4 to the ICU and 5 to theatre.

**Conclusion:** Significant variations exist in the level of observations of vital signs between different geographical locations within the hospital. This is problematic, as acute trauma patients need to be moved around the hospital as part of their routine care. If observations are not done and acted upon, subtle clinical deterioration may occur and overt deterioration may be heralded with a catastrophic event.

## THE ROLE OF ENDOSCOPIC RETROGRADE PANCREATOGRAPHY IN THE TREATMENT OF LOCAL COMPLICATIONS OF PANCREATIC TRAUMA

**D. Thomson, J. E. J. Krige, J. M. Shaw, P. C. Bornman, U. K. Kotze, M. F. Hameed**

*Surgical Gastroenterology Unit, Groote Schuur Hospital, and Departments of Surgery and Radiology, University of Cape Town*

**Aim:** This study reviewed the role of endoscopic retrograde pancreatography (ERP) and endoscopic intervention in the treatment of patients with complicated pancreatic trauma.

**Methods:** 359 patients who had pancreatic injuries between April 1983 and January 2010 were reviewed. Patients who had an ERP either pre- or postoperatively for complications of pancreatic trauma were included in the study. The indication for ERP, its timing in relation to the injury, findings at ERP, therapeutic intervention performed and the need for further surgery were analysed.

**Results:** 48 patients (42 men, 6 women, mean age 29.6, years range 15 - 68 years) who had blunt trauma ( $N=26$ ), gunshot ( $N=15$ ) or stab wounds ( $N=7$ ) to the pancreas underwent a total of 74 ERPs at a mean of 38 days (range 2 - 365 days) after their injury. The pancreatic injury involved the head ( $N=12$ ), neck ( $N=4$ ), body ( $N=18$ ) and tail ( $N=8$ ) of the pancreas; 1 site was unknown. ERP was successful in 47 patients. Twenty-four patients had a pancreatic fistula, 12 patients had a main pancreatic duct stricture and 10 patients had a pseudocyst. In 1 patient no pancreatic leak was demonstrated on ERP. Endoscopic intervention was successful in 25 patients (pancreatic duct sphincterotomy  $N=15$ , pancreatic duct stent  $N=7$ , pseudocyst drainage  $N=6$ ). Ten patients required pancreatic surgery (distal resection  $N=6$ , pancreaticojejunostomy  $N=3$ , cystjejunostomy  $N=1$ ). Ten patients resolved on conservative treatment following ERP. Of 7 patients stented, none proceeded to surgery. A total of 74 ERPs were performed on the patient group in total, with an average delay from injury until ERP of 38 days.

**Conclusion:** Pancreatic duct injury is a major determinant of outcome after pancreatic trauma. ERP is an effective endoscopic option in the diagnosis and treatment of local complications of pancreatic trauma.

## MUSCLE STRENGTH AS A SOURCE OF ENERGY FOR RECOVERY AFTER ELECTIVE SURGERY

**J. H. R. Becker, Malebo Lefhiedi, Rentia Fourie**

*Department of Surgery, University of Pretoria, and Steve Biko Academic Hospital, Pretoria*

**Introduction:** There is currently no scientific way to predict whether a patient has enough energy on board to supply calories for a successful outcome of an elective surgical procedure. Surgeons assume that the residual functionality of organs traditionally evaluated before operations as well as the appearance of the patient (young and healthy) ensures a successful outcome. It frequently happens that the operation is a great success but the patient, without any serious complications, keeps on deteriorating and eventually dies. Muscle mass is depleted during trauma (catabolism), and if there is not enough muscle available for the extend of the operation, the patient is going to run out of the necessary fuel to have a successful outcome.

**Aim:** The aim of the study is to determine the energy needed for a particular operation by measuring the loss of muscle strength during an operation. The loss will be equated with energy consumption during the operation.

**Hypothesis:** The loss of muscle strength after an operation is equitable with the energy utilised during the operation.

**Material and methods:** Muscle strength, endurance and work done of a specified muscle group, not affected by the operation, will be tested pre- and postoperatively. The strength will be calculated in kN and the work done in kN per hour. The opera-

tions selected for this study will be hernia, cholecystectomy and mastectomy. Muscle strength measurements will be taken pre- and postoperatively on the Cybex Humac Norm machine, a machine used by biokineticists for isometric muscle strength testing.

The results in the pilot study will be calculated and the difference between pre- and postoperative strength endurance and work done will be regarded to be the energy necessary for that particular operation.

**Results:** See table below.

**Conclusion:** The results indicate that there is a significant 'usage of energy' during a particular operation. In time it should be possible to determine whether a patient will have the energy resources to withstand a certain operation.

## THE DYNAMIC CONTINENCE CHALLENGE: A SIMPLE PHYSIOLOGICAL TEST TO ASSESS FAECAL CONTINENCE BEFORE REVERSING A DIVERTING LOOP COLOSTOMY

**M. Brand, G. J. Oettle**

*Department of Surgery, University of the Witwatersrand, Johannesburg*

**Introduction:** A common problem in clinical colorectal practice is being able to accurately predict which patients will be continent following repair of an anal sphincter injury. Several tests have been described, but their usefulness is questionable. The saline continence test involves instilling 1.5 litres of saline into the rectum, and assessing seepage to decide on continence. Anal manometry is unreliable. Continence can be normal with low pressures, and conversely poor with high or normal pressures. Endo-anal ultrasound illustrates the anatomical integrity of the sphincters, but not their function. What is needed to predict continence is a normal stool simulator.

**Method:** We propose the use of powdered instant mashed potato reconstituted with water to a consistency that matches the surgeon's notion of normal faeces. From this, 100 - 150 ml is introduced into the rectum using a catheter-tipped syringe. The perineum is cleaned. The patient gets dressed and is instructed to walk around the hospital for the next half hour or so. On return the underwear is examined for any leakage. Should there be no leakage, the patient would go on to have their colostomy reversed.

**Results:** Over the last 13 years 51 patients have undergone this test. In 45 patients there was no leakage, and all had their stomas reversed. No patient suffered from faecal incontinence during follow-up. In the remaining 6 patients there was significant leakage following the continence challenge, and consequently all were counselled against colostomy reversal.

**Conclusion:** The dynamic continence challenge provides an accurate physiological test, which allows clinicians to simulate colostomy reversal and assess a patient's continence before actually proceeding to the reversal.

Surgery	No. of cases	Total loss, ext 60°		Total loss, ext 180°		Total loss, flx 60°		Total loss, flx 180°	
		Right	Left	Right	Left	Right	Left	Right	Left
Mastectomy	19	46	55	60.1	61	27	24	55	77
Hernia	34	103	61	88	59	128	108	85.1	56.6
Cholecystectomy	26	73	53	54	27	66	53	63	37

## COMBINED PALLIATIVE STENTING FOR MALIGNANT BILIARY AND DUODENAL OBSTRUCTION

C. Price, J. M. Shaw, J. E. J. Krige, S. Burmeister, S. J. Benningfield, P. C. Bornman

*Surgical Gastroenterology Unit, Groote Schuur Hospital, and Departments of Surgery and Radiology, University of Cape Town*

**Background:** Biliary and duodenal stenting provides effective palliation for patients who have malignant biliary or duodenal obstruction. This study evaluated the clinical efficacy of combined palliative stenting in patients who had advanced biliary and duodenal malignant obstruction.

**Patients and methods:** Consecutive patients with advanced biliary and duodenal malignant obstruction not suitable for surgical bypass were referred for palliative duodenal stenting using self-expanding metal stents (SEMS) and biliary stenting using either SEMS or 10 or 12 Fr plastic stents. The patients were followed up prospectively from January 2009 to March 2010. Stenting was performed under fluoroscopic guidance and conscious sedation. Percutaneous transhepatic stenting was used when initial endoscopic biliary access was not technically possible. Data were collected prospectively. Demographic data, nature of the malignant stricture, stent deployment success rates, stent patency, procedural complications and survival times were recorded.

**Results:** Forty-two patients (pancreatic carcinoma  $N=31$ , cholangiocarcinoma  $N=4$ , gallbladder carcinoma  $N=3$ , antral gastric carcinoma  $N=4$ ) underwent double stenting. In 40 patients the biliary obstruction occurred before the onset of duodenal obstruction, and in 2 patients the duodenal obstruction preceded biliary obstruction. The mean pre-stenting bilirubin level was  $297 \mu\text{mol/l}$  and the mean Gastric Outlet Obstruction Severity Score (GOOSS) was 0. Duodenal stenting was successful in all 42 patients; in 3, oral intake after stenting was inadequate. Endoscopic biliary stents were placed in 33 patients (SEMS  $N=29$ , plastic  $N=4$ ), and 9 biliary stents were inserted using radiological percutaneous transhepatic biliary access (SEMS  $N=7$ , plastic  $N=2$ ). Mean hospital stay for each procedure after stenting was 3.8 days. Functional success rates with relief of jaundice were 95% (40/42) and GOOSS scores improved in 93% (39/42). Complications occurred in 3 patients with duodenal stents (gastro-intestinal bleeding in 2, stent migration in 1). During follow-up, 5 duodenal stents and 5 biliary stents blocked. The median survival after combined stenting was 85.2 days, range 4 - 320 days.

**Conclusion:** Biliary and duodenal stenting is safe and effective in malignant biliary and duodenal obstruction, and provides effective palliation in patients with advanced malignancy who are unsuitable for bypass surgery and have a limited life expectancy.

## MALIGNANT BILIARY OBSTRUCTION: A PROSPECTIVE RANDOMISED TRIAL COMPARING PLASTIC AND METAL STENTS FOR PALLIATION OF SYMPTOMATIC JAUNDICE

M. Bernon, J. M. Shaw, J. E. J. Krige, S. Burmeister, P. C. Bornman

*Surgical Gastroenterology Unit, Groote Schuur Hospital, and Department of Surgery, University of Cape Town*

**Background:** Both plastic and self-expanding metal stents (SEMS) have been used to relieve jaundice in patients with advanced malignant biliary obstruction. This study compared the clinical efficacy of plastic versus metal biliary stents.

**Materials and methods:** In a prospective randomised controlled trial 22 patients with malignant common bile duct obstruction not amenable to curative resection were offered palliative stenting from November 2008 to March 2010 and were followed up until death. The procedure was performed under fluoroscopic guidance and conscious sedation. Data were collected prospectively. Demographic data, ECOG scores, tumour size on CT, nature of the malignant stricture, stent placement success rates, complications and survival times were recorded. In the analyses we compared patient survival and stent patency rates.

**Results:** Mean ECOG scores for plastic and metal stents were similar (1.83 and 1.9), and the mean tumour size in the two groups was 3.3 cm and 4.4 cm. All patients had successful stent deployment; 12 patients received 10 Fr plastic stents and 10 expandable metal stents. There were no endoscopic retrograde cholangiopancreatography (ERCP)-related complications. The mean duration of hospital stay after stenting for both groups was 2 days (range 1 - 2 days). Jaundice was relieved in all patients. Two patients with metal stents required subsequent intervention at 8 and 21 days: one stent blocked due to a bile duct stone, and another migrated proximally and was replaced. Plastic stents in 6 patients blocked at a mean of 7 months (range 3 - 18 months) In the metal stent group 2 patients required re-admission to hospital twice (total 32 days) compared with the plastic group in which 5 patients required a total of 36 (range 1 - 16) days in hospital. Mean survival was 173 days compared with 192 days.

**Conclusion:** Plastic 10 Fr biliary stents blocked more frequently, were replaced more often and required more hospital admissions but with similar total number of days in hospital after placement compared with SEMS. These preliminary data suggest only a marginal advantage for palliative metal stenting.

## RISK FACTORS FOR EARLY REBLEEDING AND DEATH IN ALCOHOLIC CIRRHOTIC PATIENTS WITH ACUTE HAEMORRHAGE TREATED WITH EMERGENCY ENDOSCOPIC INJECTION SCLEROTHERAPY

G. Chinnery, J. E. J. Krige, U. K. Kotze, G. Distiller, P. C. Bornman

*Department of Surgery and MRC Liver Research Centre, University of Cape Town, Surgical Gastroenterology Unit, Groote Schuur Hospital, and Department of Statistics, University of Cape Town*

**Background:** Bleeding from oesophageal varices is a leading cause of death in alcoholic cirrhotic patients. Although endoscopic therapy controls acute variceal haemorrhage (AVH) in most patients, recurrent bleeding and subsequent progressive liver failure result in significant morbidity and mortality.

**Aims:** This study sought to identify risk factors for early rebleeding and death at 6 weeks in alcoholic cirrhotic patients with AVH treated by endoscopic injection sclerotherapy.

**Methods:** A retrospective evaluation using univariate and multi-variate stepwise logistic regression analysis was performed on a prospectively collected data base comprising 310 consecutive alcoholic cirrhotic patients with AVH treated at a single centre to identify risk factors related to rebleeding and death within 6 weeks of initial treatment.

**Results:** From January 1984 to December 2006, 310 alcoholic cirrhotic patients (242 men, 68 women; mean age 51.7 years, range 24 - 87 years) with AVH underwent 786 endoscopic variceal injection treatments (342

emergency, 444 elective) during 919 endoscopy sessions in the 6 weeks after their first variceal bleed. Child-Pugh grades were A: 44, B: 122, C: 144. Endoscopic intervention controlled initial AVH in 304 of 310 (98%) patients. Seventy-five patients (24.2%) re-bleed, 38 within 5 days and 37 within 6 weeks. Of the 15 variables studied and included in a multivariate analysis using a logistic regression model, bilirubin levels >51 mmol/l and >6 units of blood transfused during initial hospital admission were predictors of variceal rebleeding. No Child-Pugh A patients died, but 77 (24.8%) Child-Pugh B and C patients died, 29 (9.3%) within 5 days and 48 (15.4%) between 6 and 42 days. Mortality increased exponentially as the Child-Pugh score increased. Stepwise multi-variate logistic regression analysis showed that 6 variables (encephalopathy, ascites, bilirubin >51 mmol/l, international normalised ratio (INR) >2.3, albumin <2.5 mg/dl and need for balloon tube tamponade) were predictors of death within the first 6 weeks.

**Conclusion:** This study shows that endoscopic sclerotherapy controls acute oesophageal variceal bleeding in most alcoholic cirrhotic patients, with a rebleeding rate of 24.2%. At 6 weeks overall survival was 75.2%. Despite initial control of variceal haemorrhage, one in four patients rebled within 6 weeks. Survival is influenced by the severity of liver failure with most deaths in occurring Child-Pugh grade C patients. Patients with AVH and encephalopathy, ascites, bilirubin levels >51 mmol/l, INR >2.3 and albumin <2.5 mg/dl and who require balloon tube tamponade are at increased risk of dying within the first 6 weeks. Bilirubin levels >51 mmol/l and >6 units of blood transfused were predictors of variceal rebleeding.

## A REVIEW OF THE OUTCOME OF LOCALLY ADVANCED RECTAL CARCINOMA AT TYGERBERG HOSPITAL (2001 - 2006) TREATED WITH CURATIVE INTENT

N. du Toit, J. Lubbe

*Divisions of Radiation, Oncology and Surgery, Tygerberg Hospital and Stellenbosch University, Tygerberg, W Cape*

**Background:** According to the National Cancer Registry in South Africa (1993 - 1995) colorectal cancer was the fifth leading neoplasm in men and the third in women. In South Africa one in every 97 men and one in every 162 women is at risk; 24 234 new cases are diagnosed annually. With the introduction of staging magnetic resonance imaging (MRI), neo-adjuvant chemoradiation and total mesorectal excision (TME), 5-year local recurrence has been reported as ranging from 3.5 - 13% and overall 5-year survival is as high as 80%.

**Aim:** To review the 5-year disease free and 5-year overall survival of patients with T3 and T4 rectal cancer treated at this institution.

**Methods:** One hundred and twenty-five patients with locally advanced rectal cancer, treated from 1 January 2001 to 31 December 2006 with chemoradiation of the pelvis, as an adjuvant or neo-adjuvant therapy to surgery, were included. Parameters reviewed were demographic and clinical data, surgical technique used, pathological findings reported and chemoradiation protocol used.

**Results:** The median age was 61 years, equally distributed between the sexes; 65% of patients presented with T3 tumours, 24% with T4 tumours and 40% with positive nodal disease. Tumour position, measured from the anal verge, was found to be an average of 7 cm (range 0.5 - 20 cm) on diagnostic sigmoidoscopy/colonoscopy. Ninety-five patients had definitive resections with

43 (45%) having abdominoperineal resections and 52 (55%) low anterior resections. In 75% (12) an adequate circumferential resection margin of  $\geq 1$  mm was reported with the number of nodes recovered from each histopathological specimen showing that 21% (20) of the patients had  $\geq 12$  nodes identified as part of the nodal dissection and TME. Sixty-five patients (52%) received pre-operative chemoradiation and 60 (48%) postoperative chemoradiation. The local recurrence rate for the group as a whole was 14% and the rate of distant metastasis 23%. The 5-year disease free survival for the group as a whole was 48%. The 5-year overall survival for the neo-adjuvant group was 43%, and for the adjuvant group 58% ( $p=0.114$ ).

**Conclusion:** Given the limitations of a retrospective audit and limited resources, the results compare favourably with those of other reports.

## MUC1 IS ASSOCIATED WITH SPREAD OF DISEASE IN CHOLANGIOCARCINOMA

A. S. Mall, M. G. Tyler, S. B. Ho<sup>1</sup>, J. E. J. Krige, D. Kahn, W. Spearman<sup>3</sup>, D. Govender<sup>2</sup>

*Department of Surgery and MRC Liver Research Centre, and Departments of <sup>3</sup>Medicine and <sup>2</sup>Anatomical Pathology, University of Cape Town; <sup>1</sup>Gastroenterology Section 111D, VA San Diego Healthcare System, California, USA*

**Background and aim:** Cholangiocarcinoma (CC) is a highly malignant epithelial cancer of the biliary tract, the cellular and molecular pathogenesis of which remains unclear. Malignant transformation of glandular epithelial cells is associated with the altered expression of mucin. In this study we investigated the type of mucins expressed in CC.

**Methods:** Twenty-six patients with histologically confirmed CC were included in this study. The expression of mucin was studied by immunohistochemistry using antibodies to MUC1, MUC1 core, MUC2, MUC3, MUC4, MUC5AC and MUC6.

**Results:** There was extensive (>50%) expression of mucin, mainly MUC1 in 11/25 cases and MUC5AC in 12/26. In the case of MUC3, 6/26 cases expressed mucin extensively (>50%), while only 1/26 had MUC2, MUC4 and MUC6 expression at this level of expression. Fifteen of 25 cases had metastatic disease. MUC1 was extensively expressed in 9/15 cases with advanced or metastatic disease. In contrast, MUC1 expression was present in 2/10 cases where metastases were absent ( $p=0.099$ ).

**Conclusion:** There is a near significant association between the expression of MUC1 and metastasis in cholangiocarcinoma.

## THE POSSIBLE ROLE OF ALPHA-1 GLYCOPROTEIN, A PROTEIN FOUND IN THE CRUDE MUCUS OF PATIENTS WITH CARCINOMA OF THE STOMACH, AS A CLINICAL MARKER FOR GASTRIC DISEASE

S. Omar, Z. Lotz, E. Panieri, D. Khan, A. S. Mall

*Division of General Surgery, University of Cape Town*

Gastric cancer, a fatal malignancy, is prevalent in the Western Cape region of South Africa. There is a need to develop a biochemical marker for the detection of early changes in the stomach that could lead to cancer. Work in our laboratory has shown the presence of alpha-1-acid glycoprotein in mucus of patients with ulceration and carcinoma of the stomach. We are currently

investigating levels of this glycoprotein in the blood of patients with gastric cancer and comparing this with controls obtained from the Western Province Blood Transfusion Service.

The detection of the glycoprotein in the blood was carried out by SDS-PAGE and Western blot analysis. Western blot analysis was also used to detect levels of mucins in normal controls and bloods obtained from patients with carcinoma of the stomach.

Western blot analysis showed that levels of alpha-1-acid glycoprotein were slightly higher in the blood of patients compared with controls. So far MUC2, MUC4 and MUC6 were not detected in blood.

This study is ongoing and the results will be discussed in greater detail.

### DIAGNOSTIC VALUE OF FDG-PET/CT SCAN IN PATIENTS WITH PREDOMINANTLY ACRAL LENTIGINOUS MELANOMA AT DR GEORGE MUKHARI HOSPITAL

**N. Nkosi, M. C. M. Modiba, M. Sathekge<sup>1</sup>**

*General Surgery, Dr George Mukhari Hospital, University of Limpopo; <sup>1</sup>Nuclear Medicine, Steve Biko Hospital and University of Pretoria*

**Background:** Acral lentiginous melanoma (ALM) seems to confer a poor prognosis, mainly because the disease is often advanced at the time of diagnosis. This is attributed to high rates of misdiagnosis that delay appropriate management. Most of patients seen at our institution present with ulceration, which is the histopathological marker associated with a delayed diagnosis or the presence of advanced disease. This study investigates the value of FDG-PET/CT in detecting metastasis in these patients.

**Methods:** Case records of patients with ALM for the period 2003 - November 2009 were evaluated. All patients were initially treated with wide excision biopsy ± sentinel lymph node biopsy or complete lymph node biopsy. These patients were followed up and screened for metastases with a FDG-PET/CT scan. The median follow-up was 3 months (range 1 - 84 months).

**Results:** FDG-PET/CT scan results of 14 patients with a female/male ration of 1.3:1 were studied. The mean age was 60 (range 31 - 91). Thirteen of these patients were black. Eight out of 14 patients were Clark level 5, and 3 patients had widespread metastases, 4 regional lymph node and 1 local residual disease. There were 3 Clark level 2 patients with true negative, 2 Clark level 3 reported as true negative, and 1 false negative.

**Conclusion:** These preliminary data clearly show that FDG-PET/CT adds value to the management of patients with ALM, by detecting metastases. The metastatic lesions can be visualised as an intense tracer uptake with corresponding location on both PET and CT scan. This ongoing study is also evaluating the effect of FDG-PET/CT in the management of these patients.

### PREVALENCE OF THYROID CARCINOMA IN PATIENTS PRESENTING WITH SOLITARY THYROID NODULE AT DR GEORGE MUKHARI HOSPITAL

**M. N. Latakomo, M. C. M. Modiba**

*General Surgery, Dr George Mukhari Hospital, University of Limpopo (Medunsa campus)*

**Introduction:** The Thyroid Clinic at Medunsa is conducting several studies in thyroid disease.

**Aim:** The aim of this study is to determine the prevalence of neoplasms in patients presenting with solitary thyroid nodules.

**Methods:** A prospective study of patients presenting with a solitary thyroid nodule from January 2005 to April 2010 was done. Patients were assessed clinically and investigated with thyroid function tests, ultrasound, fine-needle aspiration, and thyroid isotope scanning using Tc99 pertechnetate and Tc99 MIBI. All patients studied were operated on and their specimens were sent for histological examination.

**Results:** In the study, 90 black patients were included (86 females and 4 males, aged 24 - 77 years, mean age of 44 years). Histological examination revealed multinodular goitre in 56 of the 90 patients.

The remaining 34 patients were found to have tumours with the following histology: 13 follicular adenoma, 7 follicular carcinoma, 6 papillary carcinoma, 2 anaplastic carcinoma, 2 Hurthle cell carcinoma, 2 adenomatous goitre, 1 embryonal adenoma, 1 cavernous haemangioma.

#### Conclusions:

1. The chances of neoplasm in patients presenting with a solitary thyroid nodule are 25%.
2. Follicular carcinoma is more prevalent than papillary at Dr George Mukhari Hospital.

### THE IMPACT OF EARLY GRAFT FUNCTION ON LONG-TERM OUTCOME AFTER RENAL TRANSPLANTATION

**D. Nel, J. Vogel, D. Kahn**

*Renal Transplant Unit, Groote Schuur Hospital, and Department of Surgery, University of Cape Town*

**Background:** After renal transplantation, early graft function (EGF) can be divided into delayed graft function (DGF), slow graft function (SGF) and immediate graft function (IGF). DGF is well documented. However, when evaluating the long-term significance of EGF, the literature shows conflicting definitions and inconsistent results. In addition, SGF, a new entity separate to DGF and IGF, is a recent and poorly understood development.

**Aim:** To investigate the risk factors for, and impact of, poor early graft function on long-term outcome.

**Patients and methods:** This retrospective cohort reviewed the records of local adult patients who underwent renal transplantation at GSH from 2004 to -2008. EGF was divided according to day 5 sCr into: IGF (sCr<150), SGF (150<sCr<450) and DGF (sCr>450 or dialysis in 1st week). DGF and SGF together comprised poor EGF (PEGF) with IGF alone representing good EGF (GEGF).

**Results:** 121 patients (77 men, 44 women, mean age 39 years, range 14 - 67 years) were included in the study. 18 were excluded on the basis of nephrectomy (N=8), death (N=7) or loss to follow-up (N=3) within the first year. Data analysis showed that non-black, cadaveric grafts, as well as male recipients, were associated with a significantly poorer EGF. Cold ischaemic time differed significantly between the GEGF and PEGF groups, with means of

8.4 and 13.3 hours, respectively ( $p=0.0005$ ). sCr at 1 year was significantly different between IGF and DGF ( $p=0.02$ ), as well as between IGF and SGF ( $p=0.04$ ), with no significant difference between SGF and DGF ( $p=0.75$ ). A comparison between the PEGF and GEGF groups yielded significantly different 1-year sCr values (126 and 166, respectively,  $p=0.01$ ), with PEGF also associated with a longer hospital stay (20 v. 14 days,  $p=0.00005$ ). Acute rejection was independently associated with a higher 1-year sCr ( $p=0.00006$ ), but in the absence of rejection GEGF and PEGF remained significantly different with regard to 1-year sCr ( $p=0.024$ ).

**Conclusions:** SGF is not related to IGF but rather to DGF, and should therefore be regarded as a form of PEGF as opposed to GEGF. PEGF has a worse long-term outcome, and this motivates for increased efforts to prevent it and greater attention to its management.

#### TIME FOR RE-EVALUATION OF MAMMOGRAPHY IN THE YOUNG: AN AUDIT OF MAMMOGRAPHY IN WOMEN YOUNGER THAN 40 IN A RESOURCE-RESTRICTED ENVIRONMENT

L. Taylor, S. Basro, J. P. Apffelstaedt, K. Baatjes

Stellenbosch University and Tygerberg Hospital, Tygerberg, W Cape

**Background:** Mammography in younger women is considered to be of limited value. In a resource-restricted environment without access to MRI and with a high incidence of breast cancer in the young, mammography remains an important diagnostic tool. Recent technical advances and better regulation of mammography make a reassessment of its value in these conditions necessary.

**Methods:** Data on all the mammograms performed at a tertiary hospital and private breast clinic between January 2003 and July 2009 in women less than 40 years of age were collected. Indications were the presence of a mass, follow-up after primary cancer therapy and screening for patients perceived to be at high risk owing to a family history or the presence of atypical hyperplasia. Data acquired were demographics, prior breast surgery, indication for mammography, outcome of mammography, diagnostic procedures and their results.

**Results:** Of 2 167 mammograms, 393 were performed for a palpable mass. In these, the overall cancer detection rate was 40%. If the mammography was reported as 'compatible with malignancy' versus 'indeterminate' versus 'benign/no abnormalities', a final diagnosis of malignancy was established in 96%, 48% and 5%, respectively. Of 367 mammograms done for follow-up after primary treatment of breast cancer, 7 cancers were diagnosed with a detection rate of 1.9%. Of 1 312 mammograms performed for screening, the recall rate was 3%, the biopsy rate 2% and the cancer diagnosis rate 3/1 000 examinations.

**Conclusion:** In contrast to past series, this series has shown that recent advances in mammography have made it a useful tool in the management of breast problems in young women, notably in a resource-restricted environment. Women should be carefully selected for screening.

#### PROGNOSIS AND TREATMENT COST OF SCREEN-DETECTED VERSUS SYMPTOM-DETECTED BREAST CANCER IN SOUTH AFRICA

A. E. Victor, J. P. Apffelstaedt

Division of Surgery, Stellenbosch University and Tygerberg Hospital, Tygerberg, W Cape

**Background:** Screen-detected breast cancer is perceived to have a better prognosis than symptomatic breast cancer. There is a paucity of data relating to the impact on prognosis and cost of care relating to the method of detection in resource-restricted countries following current guidelines in the management of breast cancer.

**Methods:** From a prospective database of a breast health centre in Cape Town, South Africa, 25 consecutive cases each of screen- and symptom-detected breast cancer were identified. Costs for all components of therapy for each patient were obtained from providers.

**Results:** The mean age in both groups was 55 years. Screen-detected versus symptomatic cancers were diagnosed earlier, and estimated 10-year mortality (5.7% v. 16.4%,  $p=0.032$ ) and recurrence (13.3% v. 26.1%,  $p=0.048$ ) rates were lower. Surgical therapy costs were not different between the two groups (R1 686 865 v. R1 752 296;  $p=0.838$ ). Radiotherapy costs had a trend to lower amounts in screen-detected cancers (R 674 680 v. R 1 089 624,  $p=0.087$ ). Systemic therapy costs were significantly lower in the screen-detected cancers (R1 340 666 v. R2 278 891;  $p=0.029$ ). The total average treatment cost was significantly lower in this group (R148 088 v. R204 832;  $p=0.024$ ).

**Conclusion:** Even in a resource-restricted environment, screening leads not only to earlier diagnosis of breast cancer with improved survival and decreased recurrence rates, but also to lower treatment costs.

#### BREAST CANCER: COMPARING OESTROGEN AND HER-2 IMMUNOHISTOCHEMICAL STAINING OF CORE AND EXCISION BIOPSY SPECIMENS

J. S. Vermaak, A. Cairns, M. Hale

General Surgery and Anatomical Pathology, National Health Laboratory Service, University of the Witwatersrand, Johannesburg

**Aim:** To compare the oestrogen and HER-2 immunohistochemical staining of the initial core and final excision biopsies in breast cancer.

**Methods:** A retrospective review of records from Charlotte Maxeke Johannesburg General Hospital Breast Clinic from the 1 January 2004 to 30 June 2009 (5.5 years). All patients with a histological diagnosis of breast cancer were reviewed ( $N=718$ ). Only patients who had both oestrogen and HER-2 immunohistochemical staining done on both the core and excision specimens were included in the study for comparison ( $N=132$ , 18.4%). Oestrogen staining was considered positive even if there was only weak staining (5% positivity), and the HER-2 receptor was considered positive when the staining was designated 2+ by the pathologist.

**Results:** 132 patients were included in the study, of whom only one was male. The mean age was 56.7 years (range 30 - 90 years). Immunohistochemical staining of the oestrogen receptor revealed excellent statistical agreement between the core and excision biopsies (91.6% agreement, kappa=0.784). There was a poor correlation when the immunohistochemical staining for the HER-2 receptor was compared between the core and excision biopsies (57.3% agreement, kappa=0.103).



**Conclusion:** There is an excellent correlation for the oestrogen receptor immunohistochemical staining of core and excision biopsy specimens. In a resource-constrained environment, this might be considered a duplication of effort. In contrast, immunohistochemical staining for the HER-2 receptor had no correlation. The reasons for this require further investigation.

## PREVALENCE OF HORMONE RECEPTORS IN BLACK WOMEN WITH BREAST CANCER

**S. Z. Molaoa**

*Department of Surgery, Walter Sisulu University and Nelson Mandela Academic Hospital, Mthatha*

### Concept clarification:

**Young women:** women 49 years and below; **very young women:** younger than 35 years; **older women:** 50 years and above; **hormone receptor (HR) positive:** positive for either oestrogen, progesterone or both; **HR negative:** negative for both oestrogen and progesterone receptors.

**Introduction:** Postmenopausal women have a higher prevalence of positive HRs than their younger counterparts do. They therefore have a survival advantage over HR-negative women. The aim of this study is to determine the prevalence of positive HRs in black patients; whether there is difference in the prevalence of HRs between younger and older women; and whether age is the determining factor for the prevalence of HRs between younger and older women.

**Materials and methods:** We retrieved and analysed 97 results for HR status and computed the aggregate prevalence of positive Rs. We compared the prevalence of HR positivity in younger women (age <50 years) with that in older women (≥50 years).

**Results:** Of the 97 results analysed, 34 (35%) were for younger women (<50), 6 (17.6%) of whom were very young women (<35); the median age for young women was 43 years. Sixty-three (65%) were older women (≥50), median age 62. Aggregate HR positivity was 69.1% (67/97) for all ages. More women were HR positive than negative (69.1%, 95% confidence interval (CI) 58.9 - 78.1%,  $p=0.0001$ ).

Five (83.3%) of 6 women younger than 35 years (14.7% of women <50 years) had positive HRs ( $p=0.20$ , 95% CI 35.9 - 99.6%). In older patients the prevalence of positive HRs was 66.7% (95% CI 53.7 - 78%,  $p<0.0001$ ), whereas it was 73.5%, in younger women ( $p=0.004$ , 95% CI 55.6 - 87.1%). There was no statistical significant difference in HR status between older and younger patients ( $p=0.2577$ ).

**Conclusion:** There was no statistically significant difference in the prevalence of positive Rs between younger (age <50 years) and older (age ≥50 years) women. Although not statistically significant, there was a high prevalence of positive HRs in women aged <35 years. In this study, age did not appear to be a determining factor for HR status.

## TAIL OF SPENCE AREA DEFECT CLOSURE – A TALE OF EVOLUTION

**Y. Brakovsky, I. Buccimazza<sup>1</sup>**

*Department of Plastic and Reconstructive Surgery and <sup>1</sup>Breast Unit, Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, Durban*

**Background:** Closure of excisional defects in the tail of Spence (TOS) area present reconstructive challenges with no clear guidelines in the literature.

**Aim:** To provide reliable and aesthetically pleasing ways of flap cover for defects resulting from tumour excision in the TOS area.

**Patients and methods:** Five patients presented to the Multi-disciplinary Breast Clinic between April 2008 and April 2010 with a variety of malignant tumours in the TOS area.

The unique characteristics of these tumours were considered when planning their management.

In the first 2 patients defect closure was achieved by means of lateral intercostal artery perforator flaps (L-ICAP) – standard in the first patient and modified in the second. Although aesthetically satisfactory, we aimed for further improvements. This led to the design of a new original flap, best described as a reverse lateral thoracic artery (LTA) flap with a specific incision pattern. The vascular supply of this flap is derived from terminal perforators of the LTA. These are marked preoperatively using a Doppler probe.

This new flap was used in the next 3 patients and is currently our method of choice.

**Results:** The unique characteristics of TOS area tumours, outcomes and photographic documentation are presented. In addition other methods of addressing excisional defects in this area are discussed, including their advantages and disadvantages.

**Conclusions:** The new flap appears to be reliable, simple and aesthetically gratifying, as the aesthetic units of the breast/chest are not violated. The resultant scars are well concealed.

## A SYMBIOTIC RELATIONSHIP: HIV AND BREAST CANCER

**P. Reddy, I. Buccimazza**

*Breast Unit, Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, Durban*

**Introduction:** In our experience, there appears to be a permissive role of HIV in the progression of breast cancer. In these patients breast cancer appears to be a more aggressive disease presenting at a younger age, with more advanced disease, a higher incidence of metastatic disease, and a higher incidence of ductal carcinoma *in situ* (DCIS). The overall survival in black patients also appears to be worse. It is uncertain whether the aggressiveness of breast cancer in the HIV-positive cohort is purely because the patients are predominantly young, black women.

**Aim:** The aim of this study was to compare our local experience of HIV and breast cancer with an age-, sex- and race-appropriate cohort of HIV-negative patients to expose their potential relationship.

**Patient and methods:** This was a retrospective analysis of all patients diagnosed with HIV and breast cancer, at the Addington Hospital Breast Unit in Durban from 1 March 2002 to 31 March 2010. An age-, sex- and race-appropriate cohort of HIV-negative patients was identified from our database. Further information, looking at tumour biology, incidence of DCIS

and stage of presentation were included in the data. The HIV-positive and HIV-negative subgroups were compared.

**Results:** A total of 1 308 patients were diagnosed with breast cancer over the 8-year study period, with only 47 proven cases of HIV; of these 4 were excluded, leaving a total of 43 HIV-positive patients with sufficient data for the study. The average age of the HIV-positive group was 40.2 years (range 24 - 70 years). Of the patients 42 were black patients and 1 coloured.

	HIV-positive patients	HIV-negative patients
	(N=43)	(N=43)
Average age (yrs)	40.2	44.3
Female gender	43	43
Race	Black 42, coloured 1	Black 42, coloured 1
IDC	41	39
Undifferentiated	0	3
ILC	2	0
DCIS	2	1
Associated DCIS	13	7
Bilateral	2	1
Multicentric/multifocal	7	2
ER pos.	24/36	22/35
PR pos.	20/36	20/35
Her-2/neu	3/15	7/16
T1/Tx	5	4
T2	7	7
T3	4	4
T4	29	28
Stage IV	10/43	7/43

**Conclusion:** It is evident that the younger patient with breast cancer has a more aggressive disease. Patients with concurrent HIV infection and breast cancer have a higher incidence of associated DCIS (35% v. 19%), multicentricity/multifocality (16% v. 5%) and metastatic disease (23% v. 16%). HIV-positive women appear to have a more aggressive biological cancer, suggesting a permissive role of the virus in the progression of cancer.

## THE THORACO-EPIGASTRIC TRANSPOSITION FLAP: THIS TROJAN HORSE DOES NOT HAVE AN ACHILLES HEEL

**P. Reddy, I. Buccimazza, Y. Brakovsky<sup>1</sup>**

*Breast Unit, Departments of General Surgery and 1Plastic and Reconstructive Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, Durban*

**Introduction:** Finding the appropriate soft tissue to cover the large defects following breast or chest wall salvage procedures can be challenging. Fasciocutaneous flaps are an alternative to the more technically demanding myocutaneous flaps.

**Aims:** The primary aim of this study is to report our experience with, and preference of, two fasciocutaneous flap techniques. The secondary aims are

to detail the profile, preceding therapies and outcomes of patients requiring salvage procedures.

**Patients and methods:** All patients requiring salvage procedures to the breast or chest wall were entered into a prospective database from 1 January 2007 to 30 April 2010. Those who underwent fasciocutaneous flap procedures were eligible for this study. Data collected from this cohort of patients included their age, co-morbidities, HIV status, previous breast or chest wall radiotherapy, stage and predictive markers, use of primary chemotherapy and response, indications for the surgery, flap technique, use of antibiotics, complications and outcomes.

**Results:** Over the 40-month study period, 30 patients underwent salvage procedures. Four myocutaneous flaps were excluded. The study group comprised 26 patients. All were female with an average age of 53 years. Co-morbidities were present in 11 patients. Four patients were HIV positive, and 5 patients had had prior radiotherapy. The majority of patients required a salvage procedure for inoperable primary breast cancer. An average of 3 cycles of pre-operative chemotherapy was given to 20 patients. In 12 patients there was either no response or disease progression. All patients received pre-operative antibiotics. Complications occurred in 7 of the 11 abdominal advancement rotational flaps and in 3 of the 15 thoraco-epigastric flaps. One patient has died of her disease. Of the 22 patients who have been followed up, 2 have developed distant metastases and 1 a loco-regional recurrence.

**Conclusion:** Salvage procedures to the breast or chest wall are infrequently required in our unit, despite the high incidence of locally advanced breast cancer. Our preferred method of chest wall cover is a fasciocutaneous flap. The best procedure in our hands is the thoraco-epigastric transposition flap.

## INVASIVE LOBULAR CARCINOMA: THE ARTFUL DODGER

**S. Naidoo, I. Buccimazza, P. Reddy**

*Breast Unit, Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, Durban*

**Introduction:** Invasive lobular carcinoma (ILC) accounts for 10 - 15% of invasive breast cancers. It is characterised by an insidious growth pattern, making clinical and radiological detection as well as accurate estimation of the extent of the disease more difficult. The distinctive pathology poses further challenges with regard to management.

**Aim:** The primary aim of this study was to compare our local experience with ILC with that currently reported in the literature. Secondary aims were to assess the contribution of MRI, response rates to primary chemotherapy and the reliability of sentinel node biopsy.

**Patients and methods:** This was a retrospective analysis of all patients diagnosed with ILC cancer at the Addington Hospital Breast Unit in Durban from 1 March 2002 to 31 March 2010. Data included age and stage of presentation, imaging modalities, predictive markers, response to primary chemotherapy, reliability of sentinel node biopsy, surgical procedures and outcomes.

**Results:** A total of 1 308 patients were diagnosed with breast cancer over the 8-year study period: only 2.4% (32) had histologically proven ILC. All were female, and their average age was 59 years. Early breast cancer accounted

for 55% of cases. The majority were endocrine-responsive. Two patients presented with bilateral ILC and 5 with metastatic disease.

In 26% of patients with stages I - III disease, standard imaging underestimated the extent of the disease. MRI was performed in 11 patients; in only 2 cases did the findings alter the initial management decision.

Nine patients received pre-operative chemotherapy, either for a mastectomy (7 cases) or breast-conserving surgery (2). A partial clinical response was observed in only 1 patient. Of the 24 patients who were operated on, 66% required a total mastectomy. Sentinel node biopsy was undertaken in 5 patients and proved reliable.

Three patients defaulted from treatment and 3 more have been lost to follow-up. Of the 26 patients followed up to date, 5 have died of their disease.

**Conclusion:** Compared with the current literature, the incidence of ILC is lower and the age of presentation younger in our setting. Standard imaging was unreliable in a quarter of our patients. The contribution of MRI was not significant. Pre-operative chemotherapy was associated with a poor clinical response, but sentinel node biopsy was reliable.

## BREAST CANCER PATIENTS IN A SINGLE UNIT, PATTERNS OF HRT USE AND MAMMOGRAPHIC SCREENING OVER A 9-YEAR PERIOD

C. A. Benn<sup>1</sup>, G. R. Edwards<sup>2</sup>, L. M. Prodehl<sup>3</sup>

<sup>1</sup>Netcare Breast Care Centre of Excellence; <sup>2</sup>Helen Joseph Hospital; <sup>3</sup>University of the Witwatersrand, Johannesburg

**Introduction:** In light of the SA Menopause Society guidelines on patients on hormone replacement therapy and with regard to mammography, we analysed a subset of patients from one centre. Quote from the SAMS website 'As with most interventions, there are benefits and drawbacks to taking menopausal hormone therapy. Treatment needs to be tailored to each woman's needs. The guiding principle should be to **take the smallest possible dose for the shortest time necessary.**'

**Method:** Patient data have been collected for 456 postmenopausal breast cancer patients presenting for treatment at this centre from 2001 to 2010. Various data had been collected from the patients' files, including mammogram reports, clinical history, biopsy pathology, final histology and final treatment given.

**Results:** Of 456 patients, 25% (117) had not taken hormone replacement therapy (HRT), 140 had been on HRT for ≤5 years, and 199 had been on HRT for >5 years; 42 of these had been on HRT for over 15 years. Of the patients on HRT, 41 had had mammograms prior to HRT, 78 had not had mammograms, and 220 were unsure or did not supply the clinical information. Eighty-one HRT patients required primary chemotherapy, and approximately 59 of these had been on HRT for >5 years.

**Conclusion:** This study shows that the recommended guidelines for the use of HRT and breast cancer screening in postmenopausal women are not being followed rigorously. Close attention to guidelines regarding HRT with regard to duration and screening may allow for earlier detection, improved prognosis and a decreased need for chemotherapy.

## THE FIT ELDERLY PATIENT SHOULD RECEIVE APPROPRIATE TREATMENT FOR CANCER

G. S. Demetriou<sup>1,3</sup>, C. A. Benn<sup>2,4</sup>, G. R. Edwards<sup>4</sup>, S. D. Moodley<sup>3</sup>, L. Prodehl<sup>2</sup>

<sup>1</sup>Medical Oncology, <sup>2</sup>Surgery, University of the Witwatersrand; <sup>3</sup>Wits Donald Gordon Medical Centre Medical Oncology Unit; <sup>4</sup>Breast Health Foundation Milpark Hospital, Johannesburg

**Background:** Under-treatment of patients based on age alone is not appropriate, and the fit elderly patient should be assessed on the basis of medical co-morbidities, risk of breast cancer relapse and risk of breast cancer death when treatment is selected, as these criteria offer the best predictor of treatment tolerability.

**Methods:** A retrospective analysis of elderly patients (≥70 years) presenting to our multidisciplinary breast cancer team from January 2000 to February 2010 was undertaken. The information was collected from a prospectively captured database in conjunction with review of patient files. The type and characteristics of the tumour, medical co-morbidities, and the type of operation, systemic treatment and radiotherapy for each of the patients was collected.

**Results:** The data on 115 breast cancer patients of 70 years of age or older were reviewed. The mean age of the patients was 75.97 years. Twenty patients (17.4%) did not have any surgery, 6 were medically unfit, 7 patients elected not to have surgery, and 7 did not have surgery due to family and cultural pressure.

Of 18 patients (15.7%) deemed inoperable at presentation, medically frail due to significant co-morbidities, hormone receptor positive and placed on neo-adjuvant hormonal blockade, only 2 (11.1%) were able to reach surgery owing to their medical frailty. Of 22 patients (19.1%) deemed inoperable at presentation but medically fit for chemotherapy, 20 (90.9%) were able to reach surgery after neo-adjuvant chemotherapy.

Of 95 patients who underwent surgery, 42 (44.2%) had a wide local excision and 53 (55.8%) had mastectomy, with 11 patients undergoing bilateral mastectomy. A total of 67 of 95 patients who had surgery (70.5%) underwent a reconstructive procedure or matching procedure for the opposite breast.

Nineteen patients (16.5%) required and tolerated adjuvant chemotherapy, with a further 15 patients (13.0%) tolerating surgery, adjuvant chemotherapy, radiotherapy and hormonal blockade. Another 15 patients (13.0%) had surgery, adjuvant chemotherapy and radiotherapy, 16 patients (13.9%) having surgery, radiotherapy and hormonal blockade. Sixteen patients (13.9%) had surgery and adjuvant endocrine treatment, 2 (1.7%) had surgery and radiotherapy, and 14 (12.2%) had surgery alone.

Of 115 patients, 83 (72.2%) tolerated two or more modalities of treatment, with 37 (32.1%) tolerating 2 modalities of treatment, 31 (27%) tolerating 3 modalities of treatment and 15 (13%) tolerating 4 modalities of treatment.

**Conclusion:** A significant number of unselected elderly patients presenting with breast cancer are able to tolerate two or more modalities of cancer treatment, including reconstructive procedures. Treatment options should be selected based on the patient's physical status, medical co-morbidities and cancer characteristics and not chronological age.

## AUDIT OF VASCULAR ACCESS PROCEDURES IN A REGIONAL REFERRAL CENTRE

**D. M. Brown**

*Department of Surgery, Frere Hospital, East London*

**Introduction:** Chronic haemodialysis prolongs the survival of patients with chronic end-stage renal failure. The eastern half of the Eastern Cape region has two public sector dialysis units. The Mthatha unit has facilities for 25 patients and the unit at East London facilities for 48, each patient being haemodialysed three times a week. All patients from these units who require construction of arteriovenous (AV) fistulas or grafts are referred to one surgeon at the Department of General Surgery at Frere Hospital.

**Aim:** A retrospective audit of results of surgical vascular access procedures done at Frere Hospital between 1999 and 2009.

**Patients and methods:** Patients referred for vascular access were assessed clinically, and where veins were unsuitable for construction of AV fistulas, subcutaneously tunnelled AV grafts were used. Surgical details were recorded contemporaneously on computer using Excel. A questionnaire was submitted to the dialysis units at Frere and Nelson Mandela hospitals to determine how many of the procedures resulted in successful dialysis.

**Results:** During the period under review, 246 procedures were recorded in 135 patients; 76 were males, 51 females, and 8 had no gender recorded. Patients averaged 35.6 years of age at the time of the procedure (range 17 - 63 years). Of the patients, 104 were from East London and 28 from Mthatha.

Few data are available on how long the fistulas/grafts remained patent. During the study period, 7 infected grafts were removed. Thrombectomy of clotted grafts was done in 10 patients. Of these patients, 6 were able to dialyse again for a while using the same graft. Five fistulas required ligation (aneurysm formation in 4 and extreme arm swelling in 1), 25 patients had renal transplants in Cape Town, one of these being transplanted twice, and 32 patients are known to have died.

Type of procedure	Usable for dialysis	Never usable for dialysis	Outcome not known
AV fistulas (N=172)	91 (52.9%)	55 (31.9%)	26 (15.1%)
AV grafts (N=37)	29 (78.3%)	8 (21.6%)	2 (5.4%)

**Conclusions:** The challenge is to improve our success rate and make the best of scarce resources while developing skills and providing a training environment for surgical registrars. We intend to make more effective use of basilic vein superficialisation. We are looking at ways of improving pre-operative assessment and postoperative surveillance.

## DEVELOPMENT OF A NUMERICAL TOOL FOR MECHANICAL ASSESSMENT OF ANASTOMOTIC CONFIGURATIONS OF UPPER-ARM STRAIGHT PTFE GRAFTS FOR HAEMODIALYSIS ACCESS

**M. N. Ngoepe<sup>1</sup>, B. D. Reddy<sup>1</sup>, D. Kahn<sup>2</sup>, C. Meyer<sup>1</sup>, T. Franz<sup>1,3</sup>**

<sup>1</sup>Centre for Research in Computational and Applied Mechanics, <sup>2</sup>Transplant Unit and Division of General Surgery and <sup>3</sup>Chris Barnard Division of Cardiothoracic Surgery, University of Cape Town

**Background and aim:** Arteriovenous (AV) access grafts for haemodialysis are one of the most radical interventions on the vascular system, resulting in a 5 - 10-fold increase in flow rate, including higher pressure and flow in the vein. More than 50% of AV grafts fail within 3 years, mainly due to narrowing of the anastomoses and the vein downstream of the graft. Because the use of AV grafts for haemodialysis access is expected to rise, there is significant interest in finding treatments that prevent or reduce these problems. In the Division of General Surgery, University of Cape Town, access grafts are predominantly constructed as straight grafts connecting the brachial artery at the elbow and the axillary vein in the axilla. The end-to-side anastomoses of these grafts are typically performed in a 90° and 45° fashion, respectively. The aim of this project was to develop a numerical tool for the assessment of the structural and fluid mechanics in anastomotic regions of straight upper-arm access grafts.

**Methodology:** The finite element (FE) and finite volume (FV) methods were employed to simulate the structural mechanics of the graft, artery and vein, and the fluid mechanics of the blood, respectively. 3D FE and FV meshes were developed in Abaqus (Simulia, Providence, RI, USA) and Fluent (Ansys, Canonsburg, PA, USA), respectively, representing the anastomotic geometry of PTFE graft (internal diameter (d) = 5.0 mm, wall thickness (t) = 0.5 mm), artery (d = 4.0 mm, t = 1.0 mm) and vein (d = 5.0 mm, t = 0.5 mm) and of the blood volume. Artery and vein were described with a constitutive model for vascular soft tissue; a hyperelastic material model was used for PTFE. Blood was assumed to be a Newtonian fluid flow and pressure conditions ascribed at the inlet and outlet cross-sections, respectively, of the FV mesh (blood) induced transmural pressure and shear forces at the fluid boundaries representing the blood-tissue/graft interface. To transfer fluid stresses in the FV mesh to wall stresses in the FE mesh (graft/tissue), a novel algorithm for mesh adaptation was developed using Matlab (Math Works, Natick, MA, USA).

**Results:** FE and FV meshes of distal (graft-vein) end-to-side anastomoses with 90° and 45° attachment angles were implemented. It was demonstrated that the mesh adaptation algorithm is indeed capable of bi-directionally interfacing the FE and FV meshes. This allowed applying the pressure and flow established in the blood to the graft and venous tissue. As such, it was possible to not only simulate the distribution of flow velocity and pressure in the blood but also to predict the deformations of and resulting stresses in the PTFE graft and the vein.

**Conclusion:** The established numerical tool may, after refinement and careful validation, be facilitated for the predictive evaluation of the performance of anastomotic techniques and configurations and the effect on the longevity of access grafts. The coupling of fluid and structural mechanics offers potential to consider mechano-biological mechanisms, such as shear stress-induced mechano-transduction, in the adverse remodelling of vascular tissue in connection with access grafts.

## CIVILIAN POPLITEAL ARTERY INJURIES: A 10-YEAR AUDIT IN AN URBAN TRAUMA CENTRE

**M. A. Banderker, P. H. Navsaria, A. J. Nicol, S. Edu, W. Bekker, N. G. Naidoo<sup>1</sup>**

*Trauma Centre and Vascular Surgery Unit<sup>1</sup>, Groote Schuur Hospital and University of Cape Town*

**Background:** Civilian popliteal artery injuries are associated with high amputation rates, ranging from 10% to 70%.

**Aim:** The aim of this study is to identify factors associated with limb loss in patients with popliteal artery injuries.

**Methods:** Retrospective chart review of a prospectively collected database of all patients with popliteal artery injuries presenting to the Groote Schuur Hospital Trauma Centre from 1 January 1999 to 31 December 2008. Demographic data, mechanism of injury, haemodynamic status, limb status (viable, non-viable or ischaemic), special investigations, associated injuries, ischaemic time, surgical treatment and amputation rate were analysed. The statistical package EPICALC 2000 (Brixton Health) was used to conduct statistical analysis. Statistical significance was defined as  $p < 0.05$ .

**Results:** One hundred and thirty-six patients with popliteal artery injuries were identified. The mean age was 29.7 years (range 13 - 84) years. Penetrating and blunt trauma accounted for 81 (59.5%) (72 gunshot and 9 stab wounds) and 55 (33 motor vehicle accidents and 22 falls) injuries, respectively. The anatomical level of arterial injury was above the knee in 39 cases, at the knee in 47, and below the knee in 34. Associated injuries included fractures in 66 patients (48.5%), knee dislocation in 29 (21.3%) and popliteal vein injury in 59 (43.4%). Limb viability on admission was assessed as viable in 40 (30.3%), ischaemic in 85 (64.4%), and non-viable in 7 (5.3%). Fifty-seven patients (41.9%) had full-blown compartment syndrome on admission. Treatment of the arterial injury involved reversed vein grafting in 68, primary anastomoses in 33, prosthetic graft insertion in 11, and primary amputation in 7. Thirty-two patients required delayed amputation, resulting in an overall amputation rate of 37.5%. Mechanism of injury ( $p=0.684$ ), concomitant venous injury ( $p=0.701$ ), fracture ( $p=0.183$ ), knee dislocation ( $p=0.784$ ), anatomical level of arterial injury ( $p=0.393$ ) and type of repair ( $p=0.086$ ) were not associated with increased amputation rates. A delay between injury and definitive repair of more than 7 hours in patients with ischaemic limbs ( $p=0.0236$ ) and the presence of compartment syndrome ( $p=0.003$ ) were the only factors significantly associated with an increased amputation rate.

**Conclusion:** The amputation rate in the current series was 37.5%. The most significant factors associated with this finding were an ischaemic time of more than 7 hours, and the presence of compartment syndrome.

## AN AUDIT OF PENETRATING CERVICAL VASCULAR INJURIES IN THE TRAUMA CENTRE AT GROOTE SCHUUR HOSPITAL

C. Varela, P. H. Navsaria, S. Edu, W. Bekker, N. Naidoo<sup>1</sup>

Trauma Centre and <sup>1</sup>Vascular Surgery Unit, Groote Schuur Hospital and University of Cape Town

**Aim:** Penetrating neck injuries carry significant morbidity and mortality. The purpose of this study was to evaluate the incidence, diagnostic modalities used and outcome of different treatment regimens in penetrating vascular neck injuries.

**Patients and methods:** Retrospective chart review of all patients admitted to the Trauma Centre from 1 January 2007 to 31 July 2009 with penetrating trauma to the neck.

**Results:** Four hundred and forty-six patients with penetrating neck injuries were seen. There were 398 (89.2%) stab injuries and 47 gunshot injuries. The mean age was 28 years and the population male dominated, with only 2 female patients. A total of 143 patients (32.1%) had angiographic imaging studies, 135 (30.2%) digital subtraction angiography and 8 had computed

tomography angiography (CTA). There were 63 (46.7%) confirmed vascular injuries. On radiological investigations, 20% of the DSA and 87% of the CTA imaging studies demonstrated a positive vascular injury. Twenty-nine patients had neck explorations, 13 without any investigation because of unstable presentation. Oesophageal injuries were demonstrated in 6 patients (1.3%). The common carotid artery was most commonly injured (31.7%), followed by the internal jugular vein (15.8%). There were 6 (9.5%) vertebral artery injuries and 2 (3%) subclavian artery injuries. False aneurysm was the most commonly detected vessel pathology seen on arteriography, followed by a complete cut-off (transection). Arteriovenous fistula between the common carotid artery and internal jugular vein was detected in 4 of the cases, and 2 had intimal tears. Primary repair of the CCA was performed in 18 patients, while 8 had vessel ligation, 3 for the common carotid artery and 6 for the internal jugular vein. The internal carotid artery was ligated in 2 of the patients. Endovascular intervention was applied in 2 patients. Twenty patients presented with a minor cerebrovascular accident of either speech impairment or partial weakness of one limb. Six presented with a major event of weakness or paralysis of more than one limb. Short-term follow-up (6 months) showed that 17 (65.3%) of the total stroke event patients had fully recovered, while 9 (34.6%) still had a residual minor partial stroke requiring physiotherapy and speech therapy.

**Conclusion:** The incidence of vascular injury in penetrating neck trauma in our centre is 14.1%. Surgical repair offered the best treatment option in carotid artery trauma.

## OPEN SURGICAL REPAIR VERSUS ENDOVASCULAR STENT GRAFT REPAIR OF PENETRATING SUBCLAVIAN ARTERY INJURIES

E. Georgiou, J. de V. Odendaal, D. F. du Toit

Division of Surgery, Stellenbosch University and Tygerberg Hospital, Tygerberg, W Cape

**Background:** Surgical repair of subclavian artery injuries is associated with significant morbidity due to the inaccessibility of the subclavian arteries and the need for sternotomy and thoracotomy for surgical access. This is associated with blood product requirements, ICU admission and long postoperative recovery, all contributing to high costs in the surgical repair of these injuries. Endovascular stent grafts have been shown to be safe, fast and effective in treating these injuries in haemodynamically stable patients. This study aims to compare the overall costs of these two techniques in penetrating subclavian artery injuries.

**Methods:** Hospital records of all patients requiring surgical management of penetrating subclavian artery injuries during the period 1996 - 2000 were reviewed. All patients who were haemodynamically stable without active bleeding or distal ischaemia and who underwent arteriography prior to surgical repair were selected ( $N=35$ ). Patients who underwent stent graft repair of penetrating subclavian artery injuries during the period 2004 - 2008 were selected for the second group ( $N=35$ ). The average cost per patient in each group was calculated taking into account the cost of blood requirements, days in the ICU, days in the general ward, theatre costs, specialist costs and prosthesis costs.

**Results:** In the open repair group 30 patients (85.7%) required blood versus 4 patients (11.4%) in the stent group. The average amount of blood transfused per patient was 4 versus 0.3 in the stent group. In the open repair group 12 patients required ICU admission, with an average stay of 3.58 days, whereas

only 2 stented patients were admitted to the ICU, both for 2 days. Theatre time was 211.7 minutes in the open group versus 80.8 minutes in the stent group. The average total days in hospital for the open group was 9.5 days versus 3.7 days in the stent group. The average cost per patient was 30.5% cheaper in the stent group as opposed to the open repair group.

**Conclusion:** Endovascular stent graft repair of penetrating subclavian artery injuries is a safe, effective and cost-effective alternative to open repair.

## PENETRATING CIVILIAN ILIAC VESSEL INJURIES

**J. C. Oliver, P. H. Navsaria, S. Edu, W. Bekker, A. J. Nicol**

*Trauma Centre, Groote Schuur Hospital and University of Cape Town*

**Background:** Injury to the iliac vessels is uncommon and carries a high mortality and morbidity. Surgical management is critical in an often shocked, acidotic, coagulopathic patient, with difficult surgical exposure and often multiple vascular injuries.

**Aim:** The purpose of this study is to report our surgical management and outcome of these patients in a centre with a high incidence of penetrating trauma.

**Patients and methods:** A retrospective record review of patients with iliac vessel injuries treated in the Trauma Centre at Groote Schuur Hospital between 1 January 2000 and 31 December 2009 was undertaken. Demographic data, mechanism of injury, surgical management, associated injuries, duration of hospital stay, complications and mortality were extracted from patient records.

**Results:** Sixty-nine patients with iliac vessel injuries were identified. Gunshot wounds accounted for 59 (85%) of the injuries. The mean injury severity score was 28 and the revised trauma score 7.0. Thirty-three (47.8%) of the patients required damage control laparotomy and a further 7 (10.1%) required packing of the pelvis. One hundred and six iliac vessels were injured, 24 (34.8%) patients had combined arterial and venous injuries, 3 patients had bilateral injuries, and 58 patients had an associated non-vascular injury, most commonly involving the small bowel or colon.

Common or external iliac arterial injuries were repaired by primary repair (9 cases) temporary shunt and delayed graft (6), vein graft (2), prosthetic graft (2) or ligation in patients with a non-viable limb (3). Intimal flaps to these vessels were noted in 5 patients; 3 were excised and grafted, and one of the 2 remaining patients developed embolisation to the limb within 24 hours, requiring amputation. Forty-seven patients (68.1%) had injuries to the common or external iliac veins; 5 were repaired, and the remainder were ligated. Of patients whose vein was tied off, 9 complained of leg swelling prior to discharge; however the swelling had settled in 5 of the 7 who returned for follow-up. All the 24 injured internal iliac vessels were ligated. These patients were as likely as those with greater iliac injuries to present in shock or require damage control operations.

**Conclusions:** In a stable patient a primary repair of a common or external iliac artery is preferred, but a temporary shunt is a viable option if the patient is unstable. Ligating the common or external iliac veins is associated with a low incidence of prolonged leg swelling. Internal iliac vessels can be ligated safely.

## THE MANAGEMENT OF PENETRATING AUXILIARY ARTERY INJURIES

**H. Gill, W. Jenkins, A. J. Nicol, S. Edu, W. Bekker, P. H. Navsaria**

*Trauma Centre, Groote Schuur Hospital and University of Cape Town*

**Aim:** The aim of this study was to examine the clinical presentation, injury patterns, surgical management and outcome of penetrating axillary artery trauma.

**Patients and methods:** A retrospective chart review of all surgically managed penetrating axillary artery injuries managed in the Trauma Centre at Groote Schuur Hospital, Cape Town, from January 2003 to December 2009 was performed. Demographic data, mechanism of injury, associated injuries, angiographic findings, treatment, hospital stay, complications and mortality were noted.

**Results:** Sixty-eight patients (mean age 29.3, range 15 - 54 years) presented with axillary artery trauma. The mechanism of injury was a stab wound in 47 cases (79.4%) and gunshot wounds in 14. The predominant clinical presentation was a pulse deficit (69%). Pre-operative angiography was obtained in 49 haemodynamically stable patients. A false aneurysm (32) and total occlusion (15) of the artery were the two commonest angiographic findings. A primary repair or resection with anastomosis was possible in 55.9% of patients. The limb salvage rate was 100%, and there were no deaths. Brachial plexus injury occurred in 41 patients (60.3%) and was the cause of major morbidity in 32 (78%) of these patients.

**Conclusion:** Primary repair of axillary artery injuries was possible in about half of the patients. Associated brachial plexus injury was the cause of major morbidity.

## REMOTE ISCHAEMIC PRECONDITIONING IN PERIPHERAL ARTERY ENDOVASCULAR INTERVENTION: A PROSPECTIVE RANDOMISED CONTROLLED TRIAL

**J. Lubbe, E. Honiball, D. du Toit**

*Division of Surgery, Tygerberg Hospital and Stellenbosch University, Tygerberg, W Cape*

**Background:** Transient sub-lethal episodes of ischaemia before a prolonged ischaemia/reperfusion injury, known as ischaemic preconditioning (IPC), have been shown to reduce the extent of myocardial infarction (MI) in humans. This protection not only acts locally but also can protect distant tissues, a phenomenon known as remote IPC. In humans, remote IPC protects against endothelial ischaemia/reperfusion injury and the extent of myocyte injury after paediatric cardiac surgery and adult coronary artery surgery, and in the setting of coronary stenting and open abdominal aortic aneurysm repair.

**Aim:** The aim of the study is to ascertain whether remote ischaemic preconditioning reduces subclinical myocardial injury in patients with peripheral artery occlusive disease undergoing angioplasty (PTA) ± stenting by measuring cardiac troponin-I blood levels. These patients represent the same at-risk population and make up the biggest part of current vascular practice. The secondary objective is to evaluate the effect of RIPC on clinically overt myocardial events.

**Methods:** This was a single-centre, single-blinded, randomised controlled trial. Written informed consent was obtained from all patients and randomisation was computer generated by a statistician. Sixty-four consecutive patients who underwent peripheral artery angioplasty  $\pm$  stenting were identified and randomised to RIPC (blood pressure cuff placed around the non-dominant upper arm and inflated to 200 mmHg pressure for 5 minutes, followed by 5 minutes of deflation, to allow reperfusion, repeated twice more) or no cuff inflated. A total of 64 consecutive patients were enrolled, of whom 32 were assigned to the control arm and 32 to RIPC. Cardiac troponin-I (cTnI) blood levels were taken prior to intervention and 24 hours thereafter. Acute myocardial infarction was defined by clinical, electrocardiographic and serological means.

**Results:** All patients had critical ischaemia of the lower extremities (Rutherford class IIB). Demographic data regarding co-morbid disease and chronic medication were comparable between the two arms of the study. TransAtlantic Inter-Society Consensus lesion characterisation, duration of angioplasty, contrast dose, radiation exposure and amount of patients undergoing stenting were also comparable between the two arms evaluated. Patients undergoing preconditioning had a significant attenuation of the rise in cTnI levels as compared to patients in the control arm ( $p < 0.0R$ ). Three patients in the control arm experienced post-procedure acute myocardial infarction as opposed to none in the preconditioned arm. Preconditioning had no effect on pre- as opposed to post-procedure creatinine levels. Long-term follow-up with regard to cerebrovascular and cardiac events is ongoing.

**Conclusion:** The simple, cheap, safe, and well-tolerated application of remote IPC in the angiogram theatre is feasible and reduces the prevalence of PTA/stent-related cTnI release and post-procedure myocardial infarction.

## A PROSPECTIVE AUDIT OF THE OUTCOMES OF LOWER LIMB AMPUTATIONS

J. T. John, T. J. John, V. Lawrence, D. Kahn<sup>1</sup>, N. Naidoo<sup>1</sup>, J. Irlam<sup>2</sup>

Departments of <sup>1</sup>Surgery and <sup>2</sup>Public Health, Groote Schuur Hospital and University of Cape Town

**Background:** Lower limb amputations (LLAs) place a significant burden on the public health system of South Africa, where the public sector already has significant shortages of both financial and human resources. This study is a prospective audit of all LLAs performed at three public sector hospitals in the Western Cape, with primary wound healing as the indicator of success.

**Methods:** A prospective audit was undertaken of all LLAs done at Groote Schuur Hospital (GSH), New Somerset Hospital (NSH) and G. F. Jooste Hospital (GFJ) from 16 February to 31 May 2009.

**Results:** Ninety patients with a total of 131 LLAs were included in the audit. Twenty-eight per cent of the amputations were due to diabetes mellitus (DM), 40% due to peripheral vascular disease (PVD), 30% due to a combined aetiology of DM and PVD, and 22% due to HIV vasculopathy. Primary wound healing was achieved in 48 of the 90 patients (53.3%). In 15 cases (16.7%) the wound was left open for formalisation purposes. The other 27 patients (30%) had had proximal amputations due to either poor healing or an infected stump. The mean length of hospital stay for the index amputation (from time of presentation until discharge) was 13 days. Primary healing was achieved in 83.3% of cases when the procedure was performed by two

registrars, 75% when performed by a registrar and an intern and 51.3% when performed by a single registrar.

**Conclusion:** Primary healing was not achieved in 30% of cases. It is therefore important to limit the cases of poor healing directly by improving surgical technique, and ensuring adequate postoperative monitoring and follow-up, and indirectly by health education and health promotion.

## SOLID PSEUDOPAPILLARY TUMOURS OF THE PANCREAS

M. M. Frost, J. E. J. Krige, E. P. Panieri, P. C. Bornman

Surgical Gastroenterology Unit, Groote Schuur Hospital, and Department of Surgery, University of Cape Town

**Background and objective:** Solid pseudopapillary tumours (SPTs) of the pancreas are rare, low-grade malignant but curable tumours that occur almost exclusively in young women. The clinical characteristics and surgical strategy in 20 patients with SPTs are discussed.

**Methods:** We report a retrospective review of 20 patients with SPTs from patients treated over a 30-year period. An evaluation of each case with respect to age, sex, common presenting symptoms and signs, type of operation, histology and tumour markers, postoperative complications and follow up was performed.

**Results:** All 20 patients were female. The average age was 24.6 years (range 13 - 51 years). Fifteen patients presented with abdominal pain and 14 had a palpable abdominal mass on examination. Of the 12 patients who had a mass in either the uncinat process (1), head (6), or neck (5) of the pancreas, 5 had a pylorus-preserving pancreaticoduodenectomy, 3 had a central pancreatectomy, 3 had a local excision, and 1 had a distal pancreatectomy/splenectomy. Of the 8 patients who had a mass either in the body (2) or tail (6), 7 had a distal pancreatectomy and splenectomy, and 1 a distal pancreatic resection and partial gastrectomy. One patient had two liver metastases that were resected in addition to the pancreatic primary. The average size of the lesions was 11.55 cm (range 6 - 20). Six patients had postoperative pancreatic or biliary leaks, of whom 3 required percutaneous drainage and 1 open evacuation. In addition, 4 other patients required re-operation. Two patients had bleeding and both were stopped by ligating the offending branch; a second patient developed a pancreatic fistula and received a distal pancreatectomy; a third patient developed *Clostridium difficile* colitis and had a right-sided and transverse colectomy. This patient developed multi-system organ failure and subsequently died. Eighteen patients were alive and well at follow-up with an average follow up of 4.8 years (range 10 months - 15 years).

**Conclusion:** Solid pseudopapillary tumours of the pancreas should be considered in the differential diagnosis in young women presenting with abdominal pain and a large pancreatic mass. The malignancy of this tumour is low grade and the prognosis is good. Complete resection is curative in most patients and metastases are rare.

## CURRENT TRAUMA PATTERNS IN PIETERMARITZBURG

N. van Staden, G. V. Oosthuizen, D. L. Clarke, D. J. J. Muckart, S. R. Thomson

Metropolitan Trauma Service Pietermaritzburg and Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal

**Introduction:** Trauma remains a major health care burden in South Africa. This study examines the pattern of trauma in Pietermaritzburg over the

period 2006 - 2009, seeking to identify trends in injury pattern and overall trauma load.

**Methods:** This study consists of three separate retrospective audits. The first audit reviewed all the trauma admissions to ICUs in Pietermaritzburg from January to December 2007. The second audit reviewed all patients with penetrating thoracic trauma admitted by the metropolitan surgical service over the 3-year period July 2006 - July 2009. This clinical audit was accompanied by an audit of the victims of penetrating thoracic trauma who presented to the police mortuary in Pietermaritzburg over the same period. The third audit reviewed all the trauma patients admitted by the Pietermaritzburg metropolitan complex over the period June - December 2009. These data were taken from the weekly metropolitan morbidity and mortality meeting.

**Results:** During 2007 a total of 179 trauma patients were admitted to ICUs in Pietermaritzburg. There were 48 (27%) gunshot wounds (GSWs), 60 (33%) stab wounds (SWs) and 71 (40%) victims of blunt trauma. The mortality rate was 25% for GSWs, 13% for SWs and 14% for blunt trauma. Over the 3-year period July 2006 - July 2009, a total of 1 186 patients with penetrating chest trauma, of whom 77 were female, were admitted to the surgical services in Pietermaritzburg. There were 1 062 SWs and 124 (14%) GSWs. Over the same period 676 victims of penetrating thoracic trauma were taken to the mortuary. There were 135 (20%) GSWs of the chest in the mortuary cohort. Of the total of 259 victims of GSWs, 52% were admitted directly to the mortuary compared with 541 (33%) of the 1 603 SWs. Over the period June - December 2009, a total of 850 trauma victims were admitted to the surgical services. The breakdown was blunt trauma (54%), GSW (9%), SW (34%). There were 463 victims of blunt trauma, of whom 328 (70%) had been assaulted and 135 (30%) had been involved in motor vehicle accidents. There were 377 victims of penetrating trauma, of whom 296 (78%) had SWs.

**Conclusion:** GSWs have stabilised at between 14% and 20% of cases of penetrating trauma, but remain more lethal than SWs. The rate of interpersonal blunt trauma is high by developed world standards; however, we are also experiencing a significant problem with motor vehicle-related trauma.

## AN AUDIT OF ERROR ASSOCIATED WITH THE INITIAL MANAGEMENT AND REFERRAL OF ACUTE TRAUMA PATIENTS IN WESTERN KWAZULU-NATAL

**C. Moodley, D. L. Clarke, S. R. Thomson**

*Pietermaritzburg Metropolitan Complex and Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal*

**Introduction:** Western KZN is a large area with approximately 3 million people. Many of these patients live in remote areas, and will be treated at a clinic or district hospital if they sustain major trauma. The periphery is plagued with chronic under-staffing and high staff turnover, resulting in trauma care of an extremely uneven quality.

**Methodology:** We have maintained a database of all trauma referrals from the periphery to our tertiary service in Pietermaritzburg. We have classified all inappropriate and problematic referrals according to four criteria. These are assessment problems, resuscitation problems, logistical problems and operative problems. Assessment problems are errors of planning. Resuscitation problems, operative problems and logistical problems are errors of execution.

**Results:** Over the period July 2009 - June 2010, we received 756 trauma referrals from the periphery. There were 65 (9%) problematic referrals during this period. Of these 12 were female patients, one a 9-month-old child, and the rest adult males. The average age was 34 years. Blunt trauma was a problem in 40 patients. There were 7 GSW victims, 17 stab victims and 1 burn victim. There were 43 assessment problems, 9 resuscitation problems, 7 logistical problems and 6 operative problems. There were 11 (16%) deaths. Three patients required amputation because of failure to recognise a vascular injury. Renal failure developed in 3 patients due to inadequate resuscitation. Two patients were transferred with untreated pneumothorax. Both of these developed a tension pneumothorax and one died. Cervical spine injuries were not recognised in 2 patients. Delay in diagnosing peritonitis was a problem in 14 patients.

**Conclusion:** There are significant deficits in trauma care in our referring hospitals. These translate into significant morbidity and mortality. Inadequate assessment and understanding of the pathology being treated is a major problem. Planning errors are more common than execution errors. This has implications for how we teach trauma care in the periphery.

## ONE HUNDRED AND EIGHT EMERGENCY OPERATIONS FOR PENETRATING THORACIC TRAUMA

**K. Reddy, M. A. Quazi, D. L. Clarke, S. R. Thomson**

*Metropolitan Trauma Service Pietermaritzburg and Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal*

**Introduction:** Penetrating thoracic trauma can usually be managed non-operatively. In a subset of patients emergency surgical intervention is necessary. This audit examines our experience with emergency operation for thoracic trauma in a busy metropolitan surgical service.

**Methodology:** A prospective trauma registry is maintained by the Pietermaritzburg metropolitan complex. This database was retrospectively interrogated for all patients requiring an emergency thoracic operation for penetrating injury from July 2006 to July 2009. A retrospective review of mortuary data for the same period was undertaken to identify patients with penetrating thoracic trauma who had presented to the forensic mortuary.

**Results:** Over the 3-year period July 2006 - July 2009 a total of 1 186 patients, 77 of whom were female, were admitted to the surgical services in Pietermaritzburg with penetrating thoracic trauma. There were 124 GSWs and 1 062 SWs. A total of 108 (9%) patients required emergency operation during the period under review. The mechanism of trauma in the operative group was SW (102), GSW (4), stab with compass (1) and fell on arrow (1). Over the same period 676 victims of penetrating thoracic trauma were taken to the mortuary. There were 135 GSWs (20%) of the chest in the mortuary cohort. Of the 541 SW victims from the mortuary cohort, 206 (38%) had cardiac injuries. In the emergency operation group there were 11 deaths (10%). In 76 patients a cardiac injury was identified. The other injuries identified were lung parenchyma bleeding (12), intercostal vessels (10), great vessels of the chest (6), internal mammary vessel (2), and pericardial injury with no myocardial injury (2). Most patients reached hospital within 60 minutes of sustaining their injury. A subset of 12 patients had much longer delays of 12 - 24 hours. Surgical access was via median sternotomy in 56 patients and lateral thoracotomy in 52.



**Conclusion:** Less than a quarter of patients with a penetrating cardiac injury reach hospital alive. Of those who do and are operated on, about 90% will survive. Other injuries necessitating emergency operation are injuries to the lung parenchyma, intercostal vessels and internal mammary vessels and great vessels of the thorax. GSWs of the thorax remain more lethal than SWs.

### A PROSPECTIVE AUDIT OF DIAGNOSTIC LAPAROSCOPY IN THE DIAGNOSIS OF ABDOMINAL TUBERCULOSIS

**D. Clarke, J. Islam, S. R. Thomson, D. Wilson, H. Dawood**

*Departments of Surgery and Internal Medicine, Edendale Hospital and University of KwaZulu-Natal, Pietermaritzburg*

**Introduction:** HIV/AIDS has resulted in a resurgence of abdominal tuberculosis (TB) in South Africa. The role of laparoscopy in making the diagnosis is undefined. This prospective study looks at the role of laparoscopy in establishing the diagnosis of abdominal TB.

**Method:** All patients with clinically and radiologically suspected but histologically or microbiologically unconfirmed abdominal TB were referred to the investigating team for laparoscopy. All grossly pathological tissues and free fluid were sent for histology and microbiological assessment.

**Results:** From January 2008 to January 2010, 166 patients were referred to us. Forty-eight patients were not fit for laparoscopy. All were HIV positive. Forty-two patients required emergency laparotomy, either for bowel obstruction or peritonitis. All 42 had positive histology for TB and 13 of them (31%) died after laparotomy. Seventy-six patients underwent diagnostic laparoscopy and 64 of them were HIV positive. Laparoscopic findings included intra-abdominal lymphadenopathy in 53, minimal ascitic fluid in 51, an intra-abdominal mass in 13, and deposits on the bowel wall, peritoneum or omentum in 15. In 10 patients (13.15%) an alternative diagnosis was found (appendicitis, adenocarcinoma, lymphoma). Forty-nine patients (64.47%) had positive histology for TB. In 17 patients (22.36%) histology revealed non-specific inflammation and reactive lymph nodes. One of these patients had a positive TB culture from a urine specimen. All but one of the the deposits biopsied were positive for TB (14/15). The masses biopsied were positive in 85% (11/13) of cases and the lymph nodes were positive in 68% (36/53). Ascitic fluid culture was positive in 35% (8/23) cases.

**Conclusion:** Laparotomy is an effective way of diagnosing abdominal TB with significant morbidity and mortality. Laparoscopy is very useful to diagnose alternative surgical pathology. Histology obtained at laparoscopy confirmed the presence of TB in 65% of cases.

### OUTCOME OF EMERGENCY LAPAROTOMY FOR ABDOMINAL TUBERCULOSIS IN A SINGLE SURGICAL UNIT

**D. L. Clarke, J. Islam, S. R. Thomson**

*Department of Surgery, Edendale Hospital and University of KwaZulu-Natal, Pietermaritzburg*

**Introduction:** The rising incidence of HIV/AIDS has resulted in a resurgence of abdominal TB in South Africa. These often debilitated patients not infrequently present with acute complications requiring surgery. We present our experience with this group of patients

**Methods and patients:** A prospective descriptive audit of all patients with

abdominal TB undergoing surgical treatment was conducted. From January 2008 to April 2009, 49 patients with positive histological findings for TB went for laparotomy. Twenty-five were male and the mean age was 32 years. Thirty-nine were HIV positive and HIV status of the others was unknown or negative.

**Results:** All had emergency laparotomy. Only 6 patients had a prior CT scan of the abdomen. Twelve patients presented with obstruction, 9 with perforation and 28 with peritonitis without free air. Intra-operative findings were: frozen abdomen in 10 cases, bowel perforation in 13, enlarged lymph nodes and ileo-caecal mass in 19 and obstructed small bowel in 7. Eleven patients (22%) had small-bowel resection and 8 (16%) had right hemicolectomies. Eighteen patients (37%) ended up with stomas (16 ileostomies and 2 colostomies) and only 2 had primary anastomoses. Fourteen patients (29%) had relaparotomies and 17 patients (35%) were admitted to the ICU. Twenty-three patients (47%) required blood transfusion and 15 patients (31%) required total parenteral nutrition. Three patients developed an enterocutaneous fistula and 5 patients were discharged with ventral hernia. Eighteen patients died (37%), of whom only 6 had bowel resection and 10 were admitted to the ICU. The mean duration of hospital stay was 14 (range 4 - 69) days.

**Conclusion:** Emergency surgery for TB of the abdomen is associated with high morbidity and mortality with a high rate of ICU admission and prolonged hospital stay, which could have been avoided by diagnostic laparoscopy.

### THE QUALITY OF LIFE OF ADULT SURVIVORS OF MASSIVE BURN INJURIES

**E. Botha, G. Joubert, S. J. A. Smit, J. Yiga, S. Paulsen**

*University of the Free State and Pelonomi Hospital, Bloemfontein*

**Introduction:** The question we were confronted with was: is it justified to put every effort into the survival of patients with massive burn injuries? Is the end result worth the effort? The current high cost of burn care is worthwhile in terms of saving lives, but has not and cannot show what quality of life has been restored. A common opinion is that it is not worthwhile to successfully treat patients with massive burn injuries as the survivors are doomed to a miserable existence. Our preliminary experience is that the majority of survivors end up living well-adjusted lives.

**Methods:** This is a prospective descriptive, survey study. The quality of life for adult burn survivors (treated at Pelonomi Regional Hospital from 2003 to 2008) with massive burn injuries ( $\geq 40\%$  total body surface area (TBSA)) was measured. The interview questionnaire contents consisted of 7 different state of life satisfaction scales: medical/physical function, financial aspects, social-emotional aspects, mental/emotional aspects, stress evaluation, life enjoyment and overall quality of life.

**Results:** Ten of 14 eligible patients were interviewed. Burn injuries ranged between 40% and 61% TBSA and were mainly full-thickness injuries.

- *Medical/physical function:* Six lost limbs or other body parts. Five experienced regular to constant physical impairments. Five experienced limitations with regard to mobility and physical functioning. Four were dependent on assistance with daily activities. One experienced poor general health.
- *Financial aspects:* All 10 of the subjects indicated that financial income plays a significant role in quality of life. All 10 of the subjects' basic needs

were fulfilled by their income, disability grants, or their family's financial support.

- *Social-emotional aspects:* Eighty per cent indicated a satisfying social-emotional well-being.
- *Mental/emotional aspects:* Seventy to 100% indicated no/rare/occasional concerns regarding 91% of the aspects on the mental/emotional scale.
- *Stress svaluation:* Sixty to 100% experienced never/rarely/occasional stress levels regarding 90% of the aspects on the stress level scale.
- *Life enjoyment:* Sixty to 90% indicated moderate/considerably/extensive levels of life enjoyment.
- *Overall quality of life:* Sixty-seven to 100% indicated that they were mostly satisfied, pleased/delighted with 77% of aspects on the overall quality of life scale.

**Conclusion:** Rescuing adults with massive burn injuries is not a futile exercise, as the majority of burn survivors were glad to be alive and were satisfied with their remaining quality of life. Resources allocated to the salvage of burn patients with massive burn injuries are justified.

Reasons for this surprising and seemingly contradictory finding could perhaps include one or more of the following:

- They are relieved of their old problems and perhaps unhappy environment.
- Family and friends pay more attention to them.
- Opportunities for the disabled are a government priority, i.e. they are trained by supportive people to acquire new skills.
- Frequently they are better off materially.

## BURN MORTALITY AT PELONOMI HOSPITAL BURNS UNIT, BLOEMFONTEIN

J. B. Yiga, G. Joubert<sup>1</sup>

Burns Unit, Pelonomi Hospital, and <sup>1</sup>Department of Biostatistics, University of the Free State, Bloemfontein

**Introduction:** Burns, arguably the most devastating of all injuries, leave the survivor with lifelong disability. Globally, mortality from burns has remained unacceptably high, especially in low-income countries.

**Aim:** The study aimed to determine the mortality and LD50 in the 'adult' section of the Pelonomi burns unit, and to identify the important contributing factors and strategies needed to favourably influence our mortality rate?

**Methodology:** This was a chart review of 109 patients who were admitted between March and July 2004, 2005 and 2006 and who filled the inclusion criteria. Study permission was obtained from the UOFS ethics committee and the clinical director, Pelonomi Hospital.

**Results:** 109 patients could be included. There were 26 deaths, yielding an overall mortality rate of 23.8%. Of the patients who died, 58% were older than 50 years. Both genders were equally represented. The LD50 was 41% TBSA, and 43.3% deaths occurred in the first 7 days (the resuscitation - post-resuscitation phase).

**Conclusion:** Our mortality rate is unacceptably high but is similar to that reported from other lower-income countries. We should manage our days 0 - 7 period more effectively and should recognise the older patient is exceptionally vulnerable to burn death.

## BURN WOUND COLONISATION IN A PROVINCIAL BURNS UNIT (PELOMONI, BLOEMFONTEIN)

J. B. Yiga, S. J. A. Smit, G. Joubert<sup>1</sup>

Burns Unit, Pelonomi Hospital, and <sup>1</sup>Department of Biostatistics, University of the Free State, Bloemfontein

**Introduction:** Burn wound infection aggravates an already devastating injury. Contamination and colonisation precede actual wound infection. Wound microbiology follows a changing pattern from week to week. This pattern was the subject of this study.

**Methodology:** In this retrospective study, wound microbiological characteristics were examined for wounds of different age (weeks 1 - 5). Antibiotic sensitivity patterns were also studied for the seven commonest organisms.

**Results:** 123 patients satisfied the inclusion criteria. They were mostly male and burnt by fire, on the extra-torso parts of the body (head, neck and limbs). The mean TBSA was 15%. The commonest colonisers were *Staphylococcus aureus*, *Acinetobacter baumannii* and *Pseudomonas aeruginosa*, but their relative density changed from week to week. Methicillin-resistant *S. aureus* (MRSA) appeared for the first time in the second and third week. For the potential pathogens identified here, the effective antibiotics were cloxacillin, clindamycin, tobramycin and gentamycin. All MRSA organisms were sensitive to vancomycin.

**Conclusion:** In burn wound colonisation, **wound age matters** and can be predictive of the identity of the colonising organism. Colonisation and infection must be distinguished and managed differently to prevent irrational antibiotic use.

## ORGANISMS GROWN AND DRUG RESISTANCE SEEN IN A SECONDARY REFERRAL CENTRE ICU AND BURNS UNIT

B. Greatorox, G. Oosthuizen, R. von Rahden, D. L. Clarke, D. Haffejee

Departments of Intensive Care, Surgery and Microbiology, Edendale Hospital, Pietermaritzburg

Infections are common in intensive care and burns units. Empiric antibiotic therapy is often required, so it is important to have a good knowledge of the resident organisms in these departments. Antibiotic resistance is becoming an increasing problem both internationally and in South Africa, and it is important to monitor organism sensitivity. We report the findings from a retrospective audit of all cultures sent from the ICU and burns unit of a South African urban hospital for the 6-month period January 2008 - June 2008. These results were compared to those from a microbiology audit of the whole of the hospital in January 2006.

The results showed that Gram-negative organisms were prevalent in the ICU department, in particular *Klebsiella pneumoniae* and *Escherichia coli*. Gram-positive organisms were more prevalent in the burns unit. Overall resistance to augmentin and erythromycin was found to be high (49% and 53% respectively), while resistance to ciprofloxacin and gentamicin was moderate (30% and 35%, respectively). However, resistance to the carbapenems and piptaz (piperacillin plus tazobactam) remained low (2% for ertapenem, 19% for meropenem and 21% for piptaz).

When looking at individual species it was noted that *K. pneumoniae* had a high level of resistance to ampicillin (97%), a moderate level of resistance to augmentin and ciprofloxacin (35% and 43% respectively), and low levels of resistance to colistin, ertapenem, meropenem and piptaz (0%, 0%, 5% and 12% respectively). *E. coli* was seen to have high levels of resistance to ampicillin (79%), but low levels of resistance to augmentin (4%), ciprofloxacin (9%), colistin (0%), ertapenem (0%), meropenem (4%) and piptaz (0%).

Since 2006 we have noted an increase in ampicillin, gentamicin and augmentin resistance in *Klebsiella* spp., but not in *E. coli*. Resistance to piperacillin and gentamicin was seen to have increased in *Pseudomonas* spp.

In conclusion, we found that Gram-negative bacteria are the most common organisms seen, in particular *K. pneumoniae*, which is consistent with the findings of other authors. These data demonstrate the progressive development of antibiotic resistance among the resident bacteria of a government hospital ICU and emphasise the need for ongoing surveillance at a departmental level.

## OUTCOMES OF ELECTRICAL INJURIES AT CHRIS HANI-BARAGWANATH HOSPITAL

J. F. Padilha, G. P. Candy, D. Maganza

Burns Unit, Department of Surgery, Chris Hani-Baragwanath Hospital and University of the Witwatersrand, Johannesburg

**Background:** The significant morbidity of electrical burn injuries is well described in the medical literature, especially in the form of major limb amputations. Reported mortality rates are generally described as low, especially in the more recent analyses. Older studies tend to show higher mortality rates. Internationally, lightning was often implicated in these deaths. Furthermore, most high-voltage electrical injuries to adult patients reviewed in the existing publications were due to occupational accidents. The pathophysiology of these injuries demonstrates the difficulty in predicting the extent of deep tissue injury on early presentation. In electrical burns tissue injury is caused by heat, oedema, compartment syndrome, vascular injury and electroporation causing direct muscle necrosis. This and the subsequent rhabdomyolysis affect disease progression, the delayed and clinically unpredictable nature of the more severe forms of these injuries making treatment challenging for the surgeon. Theft of copper, steel cables or municipal power distribution hardware is often reported in the media. A few years ago, Eskom ran a publicity campaign branding these thieves as *izinyoka* – the Zulu/Xhosa term for snake. They tried to use culturally fear-based stereotyping to try to curb what amounted to significant industry losses. Very recently published Italian data attempt to demonstrate a relationship between the increase in theft-related electrical injuries and the economic pressures of a rising copper price in the last few years. Not much has been written on electrical injuries in South Africa. The burden to our already stretched health care system and the grave consequences to individual victims have not been described well locally. One recent forensic audit recently showed a high electrical injury-related mortality and pointed towards a possible preponderance of theft-related deaths.

**Aim:** The study aims to determine the epidemiology, morbidity and mortality of electrical burns in a local South African setting.

**Methodology:** A retrospective record review is conducted of electrical burn cases at the Chris Hani-Baragwanath Hospital Adult Burns Unit in the last 15

years, from January 1995 to April 2010. The variables assessed were patient presenting factors, mortality characteristics and morbidity factors (length of stay in hospital and in the ICU, procedures performed, organ support factors). These were recorded in an Excel spreadsheet and statistical analysis was done.

**Results:** There were 104 patients with electrical burns in the period studied, comprising 7% of total burns admissions; 91% were males. The mean age was 30.2 years and the mean length of stay was 35.8 days. Mechanism of injury was divided as follows: 22.1% suspected or documented cable theft, 7.8% lightning, 15.1% domestic or informal occupational accidents, and the remainder unspecified. Mean %BSA was 19.76. Thirteen patients died during their hospital admission (12.5%), and 33 (31.7%) required ICU admission and stayed between 2 to 31 days there. The major amputation rate was 15.6%, 102 units of packed cells were used, the mean peak creatinine level was 126.3, and 14 fasciotomies, 191 sloughectomies/debridements and 92 skin grafts were performed.

**Conclusion:** A very large proportion of electrical burns in South Africa are related to cable theft. Mortality from electrical injuries is higher than international data and morbidity remains significant. Prevention strategies should be refined and implemented to reduce the burden of disease.

## A REVIEW OF BURN CARE AT AN EMERGING CENTRALISED BURNS UNIT

H. J. Kingu, E. L. Mazwai, A. Daffala, L. Mtimba

Department of Surgery, Walter Sisulu University, Mthatha, E Cape

**Background:** The aim of the study was to investigate the demographics, aetiological factors, anatomical lesions biological features, management protocol and outcomes of patients admitted with major burn injuries to e Nelson Mandela Academic Hospital (NMAH), which is one of the only three tertiary hospitals in the Eastern Cape and is in the process of establishing a designated burns unit.

**Methods:** All patients admitted to the burns ward from January 2006 to July 2008 were included in the study. All were treated using multidisciplinary team care, with a high index of suspicion for inhalation injuries, followed by prompt treatment, accurate burn extent and depth assessment, fluid therapy, patient-controlled analgesia, strict aseptic wound care, and early enteral feeding. Data collected included gender, age, residential address, cause and extent and depth of burns, serum albumin, whether any skin graft was done, hospital stay, complications and mortality.

**Results:** The sample comprised 66 patients; 59 were children <14 years old, and 38 were <4 years old. There were 34 males and 32 females, and scalds and flame injuries accounted for 68% and 17% of cases, respectively. The majority (85%) sustained burns ranging from 11% to 40% TBSA. The body areas injured were the left upper limb (60%), chest (58%), abdomen (49%) and right upper limb (48%). All sustained major burns, and skin grafts were performed on 39%. Complications included respiratory distress syndrome, fluid and electrolyte imbalances, protein energy malnutrition, infection and contracture deformities. The mean hospital stay was 3.7 days/% TBSA burn, and the overall mortality rate was 17%.

**Conclusion:** Mortality was unacceptably high. The strain of aggressive management to reduce mortality and morbidity would be alleviated by measures

such as community health education, raised socio-economic status and safety legislation. Establishing a well-staffed and well-equipped burns unit would greatly improve patient care.

### TRADITIONAL MEDICINE USED IN WOUND HEALING: A PORCINE MODEL USED TO ASSESS THE EFFICACY AND SAFETY

A. Gould, C. Patel<sup>1</sup>, G. P. Candy, C. Penny<sup>2</sup>

*Surgery Research, <sup>1</sup>Plastic Surgery, Surgery, and <sup>2</sup>Clinical Medicine, University of the Witwatersrand, Johannesburg*

**Introduction:** Indigenous plants have been used by traditional healers for a variety of remedies, some with little scientific basis, and are sometimes associated with certain degrees of toxicity. We investigated one such plant, which is anecdotally reported to improve wound healing but also to cause hepatotoxicity. A pilot study was set up to determine the wound healing efficacy in 9 pigs.

**Methods:** The animals were anaesthetised and twelve 2.5×2.5 cm square sections of skin, spaced 4 cm from each other, on either side of the spine were removed using a dermatome set to 800 µm, thereby creating deep partial-thickness wounds (DPT). The plant preparation as per the traditional healer's instruction was applied to the fresh wounds and covered by a sterile occlusive dressing to trap the wound fluid. Treated wounds alternated with control wounds treated with activated carbon and an occlusive dressing and a negative control covered only with the occlusive dressing.

The entire observational period was done over 16 days. Wound healing was assessed visually as well as by biopsy for histology. Biopsies were taken inside the DPT wounds and compared with the normal tissue retained from outside the wound. Biopsies taken for histology were placed in 10% buffered formalin, embedded in paraffin wax, sectioned at 5 µm, and stained with haematoxylin and eosin. DPT slides were photographed and the epidermal thickness was measured using planimetry software (ImageJ). A ratio was created using the measurements from inside the wound over those outside of the wound and plotted against time (days postoperative (PO)).

In theatre, the pH of the wounds was measured with a surface electrode and jugular venous blood was aspirated for liver function tests (LFTs) on the sample collection days. One month after cessation of the experiments liver biopsies were taken from 2 lobes and sent for histopathological examination for possible pyrrolizidine alkaloid (PA) poisoning associated with the plant species.

**Results:** Gross assessment of the wounds from all 9 pigs showed improved and rapid wound healing within 5 days compared with 7+ days in the activated carbon and negative control wounds. The treated wounds showed a peak in the ratio by day 7 PO compared with day 9 in both control groups, but all treatments followed a decline in the ratio after peaking at the respective days. pH values followed a similar trend, but a significant difference was noted at day 2 in the plant-treated group. Liver enzymes were raised in control and experimental pigs, but histopathological examination showed no sign of the described hepatotoxicity.

#### Conclusions:

a) The plant in question did show some efficacy in accelerating wound healing with no hepatotoxic events.

b) Microscopic histological examination showed that all wounds were re-epithelialised by day 5 PO, but the extent of the proliferation varied greatly between treated and control wounds.

c) Although blood sampling for LFTs showed some elevations in liver enzymes, pathological examination showed no signs of acute or chronic toxicity.

### THE ROLE OF SALIVA, BREAST MILK AND THEIR MUCIN COMPONENTS IN HIV-AIDS

J. Peacocke, Y. Mtheembu, Z. Lotz, M. Tyler, C. de Beer, L. Schoeman, P. Roux, D. Khan, A. Mall

*Division of General Surgery and Medicine, University of Cape Town, and Division of Medical Virology, Stellenbosch University, Tygerberg, W Cape*

The HIV-AIDS pandemic is prevalent in sub-Saharan Africa. More interventions to manage this pandemic are urgently required. Transmission of HIV is known rarely to occur by exchange of oral fluids. We have previously shown that saliva and its mucin components, together with purified MUC1 from breastmilk, inhibit the virus. In this study we tested our findings in a larger study with suitable controls.

Mucus was extracted in 4M guanidinium hydrochloride and a cocktail of protease inhibitors, pH 6.5. Sepharose CL-4B gel filtration separated MUC5B and MUC7 in saliva. Mucins in saliva and breastmilk were purified by density gradient centrifugation in caesium chloride. SDS-PAGE analysis and Western blotting determined the size, purity and identity of the mucins. The inhibitory activity of crude saliva and purified MUC5B and MUC7, from HIV-negative (N=20) and HIV-positive (N=20) donors, was tested by their incubation with subtype C HIV-1 and infection of peripheral blood mononuclear cells (PBMCs).

The presence of MUC5B and MUC7 in saliva was confirmed, and it was shown that there was inter-individual variation in their amounts. DNA analysis of the tandem repeat regions of MUC5B and MUC7 revealed no difference between groups. Crude HIV-negative and HIV-positive saliva and its purified mucins MUC5B and MUC7 significantly inhibited the infection of HIV-1 in an *in vitro* assay. Crude breastmilk did not inhibit the virus while purified mucin inhibited in an inhibition assay but the purified MUC1 did.

### ANALYSIS OF AMINO ACID PROFILES GROUPING BY MEMBRANE TRANSPORTERS

C. Naidoo, A. D. Cromarty<sup>1</sup>, G. P. Candy

*Departments of Surgery, University of the Witwatersrand, Johannesburg, and <sup>1</sup>Pharmacology, University of Pretoria*

Metabolomics is relatively new technique in disease profiling and measures metabolites below a molecular weight of 1 000 daltons, as opposed to genomics and proteomics, which study genetic variation and protein expression. Genomics requires analysis of some 35 000 genes, proteomics, of some 1 000 000 protein fragments derived from 2 000 - 3 000 proteins whereas metabolomics measures approximately 2 500 metabolites. The function of many genes and proteins is unknown, whereas the function and source of most metabolites is known. Importantly, measuring these metabolites may provide clues as to where metabolic pathways may be blocked or non-functional and possible insight regarding how to overcome these problems. Further, it is important to link such metabolic changes to the patient phenotype. This

study further analysed data from patients with hypertension, who have an easily defined phenotype and grouped amino acid concentrations by membrane transport.

**Methods:** 24-hour ambulatory blood pressures (ABPM) were measured in consenting participants of African ancestry, recruited from clinics in the Johannesburg area. Fasting blood samples were obtained and frozen until analysed by HPLC/mass-spectrometry.

**Results:** Cationic amino acid amino acids (arginine, lysine) were elevated in hypertension and correlated with blood pressure, as were the branch chain amino acids (valine, leucine and isoleucine).

**Discussion:** The elevation of cationic amino acids importantly suggests that although concentrations of arginine, the precursor of the vasodilator nitric oxide, were elevated, this was insufficient to reduce ABPM. As supplementation with arginine reduces BP, the study suggests reduced membrane transport of arginine, as has been suggested in the literature. The elevation in branch chain amino acids has been associated with 'starvation' conditions (anorexia, nutritional dwarfing, etc.) and raised fasting insulin levels, a hallmark of metabolic syndrome.

**Conclusion:** Amino acid measurements provide little information between cases and control subjects. However, grouping amino acids by membrane transporters suggests patterns consistent with those described for other pathological conditions. The approach can be applied to patients in a surgical setting.

## GENERAL KINETIC MODELLING OF AMINO ACID UPTAKE BY TWO OR MORE TRANSPORTERS INTO CELLS

M. Nel, G. P. Candy, A. J. Woodiwiss

*Departments of Surgery and Physiology, University of the Witwatersrand, Johannesburg*

Uptake of nutrients including amino acids into cells is vital for maintaining cellular function and nutrition. Although uptake by single transporters follows typical Michaelis-Menten (MM) kinetics, uptake of many amino acids is facilitated by more than one transporter with different kinetics and inhibition. This complicates determining kinetic constants as measured uptake is the sum of the uptake by the individual transporters and in many cases specific inhibitors of these transporters do not exist. Further data reporting kinetics where (a) the mode of inhibition by competing amino acids has been assumed and (b) supra-physiological or single concentrations of either substrate or inhibitors were used, may not be accurate. We present a general approach to model uptake of single amino acids transported by more than one transporter using trace of a radiolabelled amino acid in the presence of unlabelled amino acid and/or inhibitors and activators.

**Methods:** Labeled trace 3H-L-arginine (T; 10 nM) was added to confluent ECV304 cells in the presence of either unlabelled arginine inhibitors or other test substances. Uptake was stopped after 30s (initial rate kinetics) and activity taken up measured by scintillation counting. This was corrected for dilution and rate versus [arginine] (MM) and reciprocal Lineweaver-Burk plots (L/B: 1/v v. 1/s) constructed. Estimates of the kinetic constants obtained were used in non-linear additive models of the form (without inhibitor):

$$v_T = \frac{V_{maxa} \cdot [T]}{(K_{ma} + [T] + [S])} + \frac{V_{maxb} \cdot [T]}{(K_{mb} + [T] + [S])}$$

S=substrate concentration ([ ]);

$V_{max}$  and  $K_m$  for transporters a & b respectively

Refined estimates could be obtained by iteratively adjusting the kinetic constants to best fit the experimental data. The equation could be adapted to include inhibition combinations by modelling different kinds of inhibition of the respective transporters.

**Conclusions:** L/B plots provided useful estimates of kinetic constants for the respective transporters. However, such estimates overestimated uptake. Refining these estimates, using non-linear modelling, provided theoretical models which closely matched the experimental data. The L/B plots also indicated the type of inhibition occurring at various substrate and inhibitor concentrations and mostly concurred with the type of inhibition determined by non-linear modelling.

## A REVIEW OF SURGICAL TRAINING IN SOUTH AFRICA: AN ASSESSMENT OF THE EXPERIENCE, SUPERVISION, AND MAJOR CONCERNS OF SURGICAL REGISTRARS DURING THEIR TRAINING

B. A. David, D. Kahn, V. Pillay

*Department of Surgery, Groote Schuur Hospital and University of Cape Town*

**Background:** The aim of this study was to evaluate several different aspects of surgical training in South Africa, including prior work experience and supervision of surgical registrars; current working conditions; operative experience and supervision; and major concerns of registrars on a recognised surgical training programme.

**Methodology:** A questionnaire was administered to registrars attending the 2009 Registrar Symposium and SRS. The questionnaire comprised of four sections: section 1 – demographic information, undergraduate training and prior work experience; section 2 – current working conditions and supervision; section 3 – operative experience and supervision; section 4 – major concerns regarding their training. In section 4, 23 responses were recorded on Likert-type scales to different concerns ranging from personal financial and family concerns to work load and operative teaching time.

**Results:** 52 questionnaires were completed, with 20 female respondents and 32 male. 50% of respondents were white, 25% were black, 17% were Indian and 8% were coloured. The distribution of registrar institutions were as follows: Wits 28%, Stellenbosch 20%, Medunsa 13%, UCT 12%, UKZN 10%, UP 10%, UFS 4%, WSU 2%. 38% of respondents worked abroad before joining the surgical rotation. There was an average gap of 5 years and 2 months after internship before respondents started formal training. 31% of respondents had completed research for the dissertation component of the Master in Surgery degree, while 97% of candidates were indifferent about the College of Surgery's decision to make this a compulsory component of assessment. The most compelling reasons when applying to an institution for surgical registrar training were in order of importance: institutional prestige, location, undergraduate training and language. 12% of respondents would have not chosen general surgery as their first choice, with 10% applying for plastic and reconstructive surgery and 2% applying for urology. There was a striking difference between supervision during elective and emergency surgery, with respondents citing 97% and 42% of cases being operated on under supervision, respectively. 93% of respondents completed their first operation as the primary surgeon before they had started as a registrar, with the most common operations being appendectomy 36%, caesarean section 22%, and

emergency laparotomy 14%. Only 46% of these operations were supervised by a senior colleague, 27% were supervised by a qualified surgeon, and 27% were done without any supervision. The most important concerns during surgical training were in descending order: academic support for examinations and research, operative teaching time with senior surgeons and study leave for examinations. Respondents were least concerned about verbal, physical or sexual harassment during their training. There was no significant difference between responses from male versus female candidates.

**Conclusion:** Supervision during emergency surgery emerges as a key concern for the surgical fraternity in the training institutions. Academic support for research and examinations and teaching of surgical technique are the key concerns of respondents. Further and ongoing evaluation of surgical training in South Africa needs to be conducted to ensure that key concerns are identified and measures to improve training are congruent.

### THE IMPACT OF STRUCTURED CLERKING SHEETS AND ONGOING EDUCATIONAL INITIATIVES ON THE CARE OF TBI IN A REGIONAL HOSPITAL

**S. D. Hamilton, G. V. Oosthuizen, P. Hargovan, D. L. Clarke, S. R. Thomson**

*Pietermaritzburg Metropolitan Complex and Department of General Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, Durban*

**Introduction:** Traumatic brain injury (TBI) is a common problem in South African hospitals. A recent publication demonstrated that the care of TBI in our institution is substandard. In light of this a quality improvement programme (QIP) was instituted. This study audits the quality of care of TBI patients after implementation of a QIP.

**Patients and methods:** A tick-box-style clerking sheet for all TBI patients treated at Edendale Hospital was introduced in December 2009. This was to be completed concurrently with the official standard patient records, and was a structured tick box-type pro forma with space for additional clinically relevant comments and findings. It included boxes for formal treatment plans and instructions for ongoing nursing and medical care. The introduction of this new clerking sheet was accompanied by educational sessions directed at both medical and nursing staff. These sessions involved a brief overview of the pathophysiology of TBI and emphasised the importance of basic interventions to limit secondary brain damage. We reviewed the completed clerking sheets and the treatment of all TBI patients in AE and the wards for the period January 2010 - May 2010.

**Results:** A total of 6 40-minute educational sessions were held for nursing staff. The entire male and female ward complement and the AE complement attended at least one of these sessions during the period. Twelve SOPD doctors attended two similar sessions. A total of 93 patients (18 female) were admitted with TBI. CT scan was obtained in 53 (58%) patients. The clerking sheets were completed in 79% of cases. The quality of the completed clerking sheets was good in 17 (19%), average in 47 (50%) and poor in 29 (31%). Care of the patients in the ward remained of a poor quality. Cervical spine protection was instituted in 54 (58%) patients. Glucose was not measured in 54% of cases, and vital signs were not recorded in 22%. On the ward the GCS was unrecorded in 35% of cases. The average time interval between neurological observations was 7.13. Facemask oxygen was provided to 5% of patients, despite being requested. Three patients (3.2%) were transferred to Durban for neurosurgery.

**Conclusions:** Despite educational initiatives and the parallel tick box-style clerking sheet the treatment of TBI at Edendale Hospital remains problematic. A quality improvement programme needs to be ongoing and must be supported by senior nursing staff. Structural changes such as developing short-stay acute wards with appropriate resources to observe and manage acute trauma patients are essential. Making the TBI clerking sheets the official patient record may improve compliance. Without these changes, improving care will remain a challenge.

### LAPAROSCOPIC-ASSISTED COLECTOMY FOR RESECTION OF SIGMOID VOLVULUS

**M. D. Ntsoane, A. Mokhtari, M.C.M. Modiba**

*Department of Surgery, University of Limpopo (Medunsa campus)*

**Introduction:** Sigmoid volvulus is responsible for 20 - 54% of intestinal obstruction in Africa, affecting mainly young males. Resuscitation, sigmoidoscopic decompression and rectal tube placement are accepted as initial management if bowel is viable. Most surgeons agree that definitive treatment includes sigmoidectomy.

**Aim:** To assess feasibility of laparoscopic-assisted colectomy for resection of sigmoid volvulus.

**Method:** Three patients presenting with sigmoid volvulus following decompression between February and May 2010 were selected and offered a lap-assisted colectomy. Volvulus was deflated using a rigid sigmoidoscope. One patient had a recurrence and was deflated using a colonoscope. The procedure includes placement of a camera port at the umbilicus to perform an exploration, confirm diagnosis, and select the appropriate site for skin incision. The camera port is withdrawn, a 5 cm skin incision is made in the left iliac fossa, and the sigmoid colon is delivered and resected. A side-to-side stapled anastomosis was done and both wounds were closed. All patients received pre-operative antibiotics and none received postoperative antibiotics. All patients had pre-operative anaesthetic evaluation and bowel preparation with polyethylene glycol. Age, sex, length of hospital stay and complications were noted.

**Results:** All 3 patients were black males with ages of 19, 29 and 52 years, without co-morbid disease. All had redundant sigmoid colon observed intra-operatively. One patient had preoperative recurrence following deflation and 1 patient developed superficial wound sepsis. No mortality was experienced.

#### Conclusions:

1. Laparoscopic-assisted colectomy for sigmoid volvulus is an attractive alternative to open surgery.
2. A larger series is required to determine morbidity, mortality and recurrence rate.

### VIDEO-ASSISTED THOROSCOPIC SURGERY: INITIAL EXPERIENCE AT SEBOKENG HOSPITAL

**M. Z. Koto, R. Isakoy, R. Jacks, P. van Wyk**

*Surgery, Health Sciences, University of the Witwatersrand and Sebokeng Hospital*

**Introduction:** Video-assisted thoroscopic surgery (VATS) has been used in a variety of settings, with minimal morbidity and mortality. We document our initial experience at Sebokeng Hospital.

**Method:** We collected records of patients who had undergone VATS at Sebokeng Hospital and a clinic private hospital. Demographics, clinical indications, operative findings, outcome and complications were recorded. All except one 8-month-old patient were operated on under general anaesthetic using single-lung ventilation.

**Results:** During a 48-month period we recorded 19 male and 6 female patients, with an average age of 36 years (range 8 months - 69 years). The indications for VATS included:

- trauma: non-resolving haemo/pneumothorax, empyema, foreign body retention
- pleural and lung biopsy
- pneumonic complication
- mediastinal mass
- cervical sympathectomy for hyperhidrosis.

Complications included 1 conversion to open thoracotomy due to extensive adhesions, 2 patients with incomplete lung expansion, and 1 patient requiring transfusion. Recovery was otherwise uneventful and no mortalities were recorded.

**Conclusion:** VATS is a viable and safe option for clotted haemothorax and decortication, as well as many other indications. Early intervention is advised to avoid complications.

## LAPAROSCOPIC INGUINAL HERNIA REPAIR: THE INEXPENSIVE WAY

**T. Monareng, M. Z. Koto, S. D. Mokotedi**

*Surgery, Health Sciences, University of the Witwatersrand and Sebokeng Hospital*

**Introduction:** Laparoscopy is increasingly becoming the popular way of treating inguinal hernias. The advantages are less postoperative pain, early return to work and less recurrence in experienced hands. The cost remains the most prohibitive factor with this approach.

**Aim:** To present our experience with laparoscopic repair using inexpensive tools.

**Methods:** This was a non-randomised prospective study looking at the patients who underwent laparoscopic inguinal hernia repair at Sebokeng Hospital between January 2009 and April 2010. Patients with proven inguinal hernia had laparoscopic repair under general anaesthesia.

The ports were re-usable. Extra-peritoneal space was created using sponge holder forceps and 00 telescope. A 3-D mesh was placed and fixed with tuckers.

**Results:** The series included 97 patients (91 males and 6 females), with a mean age of 35 years (range 14 - 81 years). Direct - 38 cases; indirect - 59; complications - haematoma 6, seroma 11; mortality - 1 (myocardial infarct); recurrence - 1.

**Conclusion:** TEPP is feasible using inexpensive tools.

## PENILE RECONSTRUCTION AFTER AMPUTATION FOLLOWING TRADITIONAL CIRCUMCISION IN THE EASTERN CAPE

**D. M. Brown, B. D. Ritchie**

*Surgery, Frere Hospital, East London*

**Background:** Xhosa males traditionally undergo an initiation process into adulthood, in which they undergo circumcision. Each year, many young men are admitted to hospital suffering from severe metabolic derangements due to lengthy periods of enforced dehydration and infective complications. Local damage, caused mainly by tight bindings and contamination, presents as wound infection or penile gangrene which results in variable loss of tissue. The plastic surgical service at Frere Hospital receives referrals from the entire eastern half of the Eastern Cape. It is run by a full-time medical officer under the supervision of a part-time consultant reconstructive surgeon.

**Patients and methods:** We analysed a surgical procedure database recorded contemporaneously in Excel, supplemented by patient hospital records. Included were patients who presented to the Frere Hospital plastic surgical clinic from 1999 to 2009. All had undergone tribal circumcision complicated by gangrene and loss of penis to the level of the pubis. Preliminary preparation of the existing urethral opening by means of urethral meatoplasty or dilatation was mandatory. Phalloplasty was offered in several stages involving a bipediced skin flap incorporating the new urethra. The flap was detached and joined to the existing urethra and in a final stage separated from the thigh. Each stage lasted several weeks while waiting for maturation and healing.

**Results:** Of 18 patients referred with complete loss of the penis during this time, 10 underwent preliminary urethral meatoplasty for orificial stenosis, and 1 underwent dilatation. Eleven patients commenced the staged phalloplasty; 2 completed only the first stages and were lost to follow-up, and 9 completed all stages. Of these, 1 developed partial necrosis of the tip of the new penis, but it was salvaged after debridement, and 3 required repair of a urethral fistula at the base of the new penis. One patient was seen again after a year, reporting that he was happy with the result.

**Conclusion:** Phalloplasty by tubed pedicle results in a floppy, anaesthetic appendage, the only advantages of which are that it provides a way to pass urine while standing, and some psychological relief. The time involved, and complications of the treatment, deter both patients and surgeons. However, phalloplasty by radial free forearm flap, as described in the literature, is a standardised and reliable one-stage procedure with potential to provide a well-vascularised sensate phallus that looks natural and is functional. It is our intention to introduce this method of reconstruction in future.