

# Compliance to the South African ventral hernia guidelines: inaugural results from the HIG(SA) registry

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**Background:** The Hernia Interest Group (HIG) of South Africa (SA), following the publication of their inguinal and ventral hernia guidelines (in 2015 and 2016 respectively), developed a hernia registry, the HIG(SA) hernia registry.

**Methods:** A retrospective analysis of the prospectively maintained HIG(SA) hernia registry from 1 February 2019 to 29 February 2020. Compliance to six recommendations made in the HIG(SA) ventral hernia guidelines were assessed in both the public and private healthcare systems.

**Results:** Three hundred and fifty-three ventral hernia repair cases were included in the study. Fifty-four per cent were private and 46% were public sector cases. Laparoscopic repair for patients with a BMI > 35 kg/m<sup>2</sup> occurred in 38% of eligible cases and a minimum 5 cm of mesh overlap was achieved in 50% of cases. Overall, 80% of elective cases occurred in non-smokers; 97% of the intraperitoneal on-lay mesh (IPOM) repairs used composite mesh; 96% of ventral hernias with defects of larger than 2 cm and 95% of incisional hernias were repaired with mesh. Non-smokers undergoing repair numbered 72% in public and 85% in private practice,  $p = 0.01$ .

**Conclusion:** Ventral hernia repair practices in SA facilities overall had good compliance to four out of the six HIG(SA) ventral hernia guidelines highlighted for the purposes of this study. The two guidelines that had poor compliance overall were ‘laparoscopic repair for patients with a BMI of > 35 kg/m<sup>2</sup>’ and ‘ensuring a mesh overlap of 5 cm’. The public sector had higher rates of current smokers undergoing elective ventral hernia repair.

**Keywords:** registry, low-middle income countries, ventral hernia, hernia guidelines

## Introduction

Ventral hernias are commonly encountered by South African general surgeons, representing 10–17% of the elective general surgery burden.<sup>1,2</sup> Management options of a ventral hernia are myriad and range from non-operative approaches to advanced surgical techniques. Surgical repair may encompass open or laparoscopic procedures, with or without the use of mesh and may require complex component separations.<sup>3–7</sup> Patient risk profiles, presenting symptoms and the characteristics of the hernia should be considered together with the capabilities of the surgeon and the institution when selecting a repair technique.

Availability of resources in South Africa (SA) differs between the public and private healthcare sectors and there is unequal access to surgery. This is demonstrated by the number of general surgeons per population, which are 0.82 per 100 000 in the public sector compared to 5.91 per 100 000 in the private sector.<sup>8</sup> This disproportionate healthcare environment further impacts the choice of technique to repair a specific ventral hernia. Additionally, available international guidelines might not be universally applicable

to this setting. As a result, locally relevant national ventral hernia guidelines were provided by the Hernia Interest Group of South Africa, HIG(SA), in 2016.<sup>4,9</sup> Following these guidelines, the HIG(SA) launched a South African national hernia registry in February of 2019. Review of the ventral hernia aspect of this registry revealed the participation of 43 surgeons, 29 (67%) of whom were from the public sector, while 14 (33%) were practising in a private capacity.<sup>10</sup>

This study evaluates the initial results of the HIG(SA) registry. We aim to provide a snapshot of the current practice in ventral hernia repair in SA by assessing compliance of both the public and private healthcare sectors to six selected HIG(SA) ventral hernia guideline recommendations.

## Methods

A retrospective analysis of the HIG(SA) hernia registry was performed. All ventral hernia repair patients, older than 18 years of age, who were entered into HIG(SA) hernia registry during the study period from 1 February 2019 to 29 February 2020 were included. Participating surgeons obtained informed consent for inclusion of patients onto the

registry. Patient data was allocated a unique identification number to maintain confidentiality. Data was kept in a password protected, encrypted online storage system. Demographic information, including gender and age, and clinical parameters including body mass index (BMI), smoking status and diabetes were collected. Six out of the 40 recommendations made in the HIG(SA) ventral hernia guidelines (2016) were highlighted by an internal working group as key indicators of current ventral hernia practices in SA. The six recommendations were topical in current international publications and the practices of SA surgeons in these areas were untested, leading to their inclusion.<sup>11-14</sup>

### Statistics

R version 3.6.3 (<https://www.r-project.org/about.html>) was used to perform data analysis. Medians with interquartile ranges (IQR) were used to describe continuous variables while percentages and counts were used for categorical data. Normality of continuous variables was assessed using the Shapiro–Wilk test, and then compared using appropriate parametric and non-parametric tests. The chi-squared and Fisher’s exact test were used to compare categorical variables. A two-tail test hypothesis was used with 0.05 as a discriminator for rejection of the null hypothesis.

### Results

A total of 353 ventral hernia cases were captured during the study period of 13 months. There were 190 (54%) cases done in the private sector and 163 (46%) cases done in the public sector. Table I provides an overview of the demographics and comorbidities of the patients included in this study.

The six HIG(SA) ventral hernia recommendations that were selected for comparison are highlighted in Table II. Overall, 98 patients had a BMI > 35 kg/m<sup>2</sup> and laparoscopic repair technique was used in 38% of this group. In this sub-group, the private sector performed laparoscopic repairs in 45% compared to 31% in the public sector.

For incisional hernia repairs overall, 95% of all cases made use of mesh. Private surgeons utilised mesh in 97% and public surgeons in 92% of incisional hernia cases. For hernias with defects larger than two centimetres (cm), mesh use was 96% overall with private and public surgeons employing mesh in 97% and 94% of cases in this scenario respectively.

Composite or strand-coated anti-adhesive mesh for intra-peritoneal on-lay mesh (IPOM) repair was used in 97%, 127/131 of repairs, 98% and 96% in the private and public sectors respectively.

A total of 313 mesh repairs were done in our study. Overall, 50% of these repairs had mesh overlap of 5 cm or more, 40% in the private and 62% in the public sectors.

Of the 304 elective cases captured during our study period, 80% were completed on non-smokers. 85% of the private and 72% of the public elective cases were performed on non-smokers.

### Discussion

We reviewed the 2016 HIG(SA) ventral hernia guidelines and selected six recommendations for use as a measure of what the current practice in South African ventral hernia repair is.<sup>4</sup> Based on author consensus, we selected 80% as a

**Table I: Demographics of patients undergoing ventral hernia repair, HIG(SA) registry 2019**

	Overall, n (%)	Private, n (%)	Public, n (%)	p-value
	353	190 (54)	163 (46)	
Men	178 (50)	107 (56)	71 (44)	0.02
Women	175 (50)	83 (44)	92 (56)	0.02
Current smokers	76 (22)	30 (16)	46 (28)	0.01
Past smokers	75 (21)	40 (21)	35 (22)	1.00
Never smoked	202 (57)	120 (63)	82 (50)	0.02
Diabetes	77 (22)	51 (27)	26 (16)	0.02
BMI > 35 kg/m <sup>2</sup>	98 (27)	47 (25)	51 (31)	0.21

**Table II: Application of selected HIG(SA) ventral hernia guidelines (2016), HIG(SA) registry 2019**

	Overall	Private	Public	p-value
<i>Laparoscopic ventral hernia surgery should be the approach of choice for patients with a BMI &gt; 35 kg/m<sup>2</sup>, where technically feasible</i>				
Laparoscopic repairs in BMI > 35 / BMI > 35 (%)	37/98 (38)	21/47 (45)	16/51 (31)	0.25
<i>Every incisional hernia requires a mesh repair</i>				
Mesh used for incisional hernias / all incisional hernias (%)	158/167 (95)	86/89 (97)	72/78 (92)	0.31
<i>Ventral hernias with a defect &gt; 2 cm require a mesh repair</i>				
Mesh used for defects > 2 cm / all defects > 2 cm (%)	204/213 (96)	111/114 (97)	93/99 (94)	0.31
<i>Intra-peritoneal mesh repairs should be performed with a composite barrier mesh or strand coated anti-adhesion mesh</i>				
Anti-adhesion mesh used for IPOM / all IPOM repairs	127/131 (97)	84/86 (98)	43/45 (96)	< 0.93
<i>A minimum overlap of 5 cm before defect closure should be planned in all mesh repairs</i>				
Overlap of ≥ 5 cm / all mesh repairs (%)	155/313 (50)	70/176 (40)	85/137 (62)	< 0.01
<i>Cessation of smoking for at least four weeks prior to surgery</i>				
Elective non-smokers / all elective hernia repairs (%)	242/304 (80)	149/175 (85)	93/129 (72)	0.01

cut-off for good compliance to the guidelines and it is used in this article solely for illustrative purposes.

Both the public and private sectors were adherent to the “every incisional hernia requires a mesh repair because there is a significantly lower recurrence rate” and “ventral hernias with a defect of greater than 2 cm require a mesh repair” guidelines. The principle of mesh use for incisional hernia repair is well founded in published literature with a Cochrane review of eight randomised control trials which show that recurrence rates are significantly lower when mesh is used.<sup>11</sup> Ideally, mesh is recommended for all ventral hernia repairs as it reduces the incidence of recurrence, however, the use of mesh does incur an increased risk of surgical site infection and seroma when compared to simple suture repair. For small hernias without other risk factors, it might still be acceptable to perform a suture repair in selected cases, although there is a growing body of evidence against this practice. The SA guidelines suggest 2 cm while the International Endo-Hernia Society (IEHS) uses 1 cm as a size limit beyond which mesh is wholly recommended.<sup>4,7</sup>

Areas where the guidelines were not well observed included the recommendations stating that “where technically feasible laparoscopic ventral hernia surgery should be the approach of choice for patients with BMI > 35 kg/m<sup>2</sup>” and “a minimum overlap of 5 cm before defect closure should be planned in all mesh repairs”.<sup>4</sup> In obese patients, wound and mesh complication rates are improved in laparoscopic compared to open ventral hernia repairs, with acceptable recurrence rates.<sup>12-15</sup> It is also a recommendation in the 2014 IEHS guidelines.<sup>16</sup> Marx et al. found high rates of seroma formation (26.5%) in the laparoscopic ventral hernia repair patients, but also noted that this was seldomly symptomatic and all were treated conservatively.<sup>14</sup> Possible reasons for such low rates of laparoscopic repair in obese patients could be surgeon preference, patient preference, limited available resources or lack of awareness of the HIG(SA) guidelines. This identifies a potential for future in-depth analysis of our HIG(SA) registry to determine outcomes in this cohort of patients and reasons for poor compliance to this recommendation. The recommendation that an overlap of 5 cm of mesh should be planned in all mesh repairs has recently been expanded upon by the updated IEHS guidelines for laparoscopic ventral hernias.<sup>4,7</sup> The new IEHS guidelines suggest a mesh overlap based on the mesh/defect (M/D) ratio. Experimental models suggest that hernia defects of increasing size require increasing mesh overlap. In simpler terms, using a 5 cm overlap for a 1 cm defect may be excessive, but using a 5 cm overlap for a 15 cm defect amounts to futility.<sup>17</sup> The understanding is based on the mesh surface area, which should be 13–16 times larger than the defect surface area. This ensures that enough of the mesh is in contact with the abdominal wall to adequately distribute the forces, thereby reducing recurrence risk.<sup>17</sup> The IEHS suggest an M/D area ratio of 16:1, but an easier calculation is to use an M/D radius ratio of 4:1.<sup>7</sup> Nevertheless, an overlap of 5 cm was prescribed in the HIG(SA) guidelines and of the 313 mesh repairs done, only 50% reported a 5 cm or more overlap. Both the private sector and public sector had low rates of adherence to this guideline, suggesting a need for improved awareness of current literature, specifically the latest IEHS laparoscopic ventral and incisional hernia treatment guideline.

The guideline, “intraperitoneal mesh repairs should be performed with a composite barrier or strand coated anti-adhesion mesh” was well adhered to by both the private and public sectors. Use of uncoated polypropylene and polyester meshes (lacking a composite barrier or strand coating) in the intraperitoneal position is associated with an increased risk of adhesions and mesh erosion into bowel.<sup>18-20</sup> Furthermore, it has been shown that using a barrier coated mesh can reduce the number and character of adhesions, producing filmy adhesions which are more easily dissected should reoperation occur.<sup>19,20</sup> The HIG(SA) recommendation discourages the use of unprotected meshes in the intraperitoneal position.<sup>4</sup>

The last selected HIG(SA) recommendation suggests, “cessation of smoking for at least four weeks prior to surgery”. Of the 304 elective cases, 20% overall were still smoking. This represents 15% in the private and 38% in the public sectors. Compliance is equal to the 80% benchmark overall, but the public sector only has 72% compared to the 85% compliance in the private sector. Ideally, no current smokers should undergo elective ventral hernia repair. It has been well described that smoking cessation for more than four weeks can reduce the relative risk of all postoperative complications by almost 50%.<sup>21,22</sup> Difficulty rebooking non-compliant patients onto lists and severely symptomatic hernias requiring expedited repair are possible reasons for the higher rates of smokers in the public arena. If patients are made aware of the increased risk incurred by smoking and they are given fair opportunity to rehabilitate but they choose not to, then it is left for the surgeon and the patient to have an open discussion about the risks and benefits of proceeding with surgery.

A weakness of this study is the low participation rate and poor 30-day follow-up (30%) experienced during the first year of the registry. Follow-up was notably better in the private sector (42%) than in the public sector (14%).<sup>10</sup> To gain long term benefit from this registry, better follow-up data capture will be required. The methodology could be criticised as an arbitrary cut-off for compliance was set and the six guidelines selected might not be representative of actual compliance to the HIG(SA) guidelines. However, this study provides a valuable snapshot of perceived compliance to the available guidelines. Its intention is to offer insight into the current practices of ventral hernia repair in SA. Naturally, the hernia enthusiast who participated in this new, voluntary registry is anecdotally more likely to know and follow the HIG(SA) guidelines. Valuable work would be to validate this registry to true hernia practices in South Africa. This study did not investigate whether outcomes were altered by improving compliance. This is a potential avenue of further research if adequate follow-up is achieved using the HIG(SA) registry.

## Conclusion

Ventral hernia repair practices in SA facilities overall had good compliance to four out of the six HIG(SA) ventral hernia guidelines highlighted. The two guidelines that had poor compliance overall were ‘laparoscopic repair for patients with a BMI of > 35 kg/m<sup>2</sup>’ and ‘ensuring a mesh overlap of 5 cm’. The public sector had higher rates of current smokers undergoing elective ventral hernia repair. This study provides a snapshot of the current ventral hernia practices as logged on the HIG(SA) registry.

## Acknowledgements

This research formed part of a dissertation for the University of Edinburgh MSc (surgical sciences) and the main author acknowledges their positive contributions. HIG(SA) for establishing and maintaining the national hernia registry. The surgeon community involved with recording cases onto the HIG(SA) registry.

## Conflict of interest

The authors declare no conflict of interest.

## Funding source

None.

## Ethical approval

This study protocol was approved by the Human Research Ethics Committee of the University of Cape Town (HREC 084/2020).

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