

EDITORIAL

Internal fixation with solid fusion and late recurrent lumbar spine pain

For many years I have been puzzled by the late recurrence of low back pain, sometimes with lower limb pain, in a few of my patients whose spinal fusion surgery for low back pain appeared to have been entirely successful from a technical point of view. The opportunity to raise the matter in the form of an editorial article is gratefully accepted. The temptation to brush the subject aside on the basis of relative rarity should be resisted: we should be doctors first and statisticians last.

Over many years of moderate success in performing posterior fusion surgery with pedicle screw fixation for low back pain, I have been left in confusion by 13 patients who were initially grateful for the excellent pain relief afforded by the surgery but who returned years later with a spontaneous recurrence of low back pain located in the same area as the initial pre-operative disabling symptoms. There was an apparently solid fusion on imaging, starting with flexion/extension lateral plain films, and devoid of any of the classic signs of pseudarthrosis. One patient with an unusually long fusion, T10 to the pelvis, demonstrated loose screws at T10 and the pelvis. At surgery for removal of the titanium pedicle screw fixation, the fusion mass was seen to be complete, throughout. One patient had a broken rod but a solid fusion at removal surgery. MRI provided proof of intact discs at levels proximal to the fusion, in all patients. My cohort of 13 patients includes 10 females. Mean age at removal surgery was 53 years. Original fusion surgery was performed L4–S1 in 12 patients, L5–S1 in one, and T10–S1 in another. Average time to recurrence of back pain after fusion surgery was 4.5 years, ranging from 1 to 12 years.

The received wisdom, entirely anecdotal among spine surgeons in conversation, is that removal of internal fixation is fraught with failure to produce any result other than disappointment and possible further complications. Removal of the pedicle screw fixation was undertaken in my few patients as a desperate measure, against the received wisdom but with dire warnings to my patients to retain low expectations. Twelve of the 13 patients reported gratifying improvement in their low back pain and quality of life at the one-year follow-up, with complete relief in four patients. There were fortunately no further complications. The surgical exposure provided an opportunity to inspect the posterior fusion mass throughout after meticulous dissection of scar tissue; to provide strenuous stresses on the fusion mass to exclude any sign of movement where there should be none; to judge the internal fixation firmly seated (in one case, not); and to exclude the possibility of irritation cysts around the screw heads.

The question remains: What is going on here and what is the mechanism of pain production? These patients presented with such good early results of pain relief at the one-year follow-up after fusion surgery, sufficient to render it churlish to dismiss these patients with a diagnosis of psychosocial instability. These are psychologically robust people. Investigations failed to reveal any new pathology.

Is it possible that the mere presence of metal, whether stainless steel or titanium, can react in some strange way with the bone and tissues of some (very few) patients? Is this a form of allergy? (I have to confess that I failed to send any of my patients for testing for allergy to metals, and an opportunity may have been lost.) Can the metal set up some form of subtle battery effect with the tissues, sufficient to cause pain? Can there be some micro-movement between metal and bone, undetectable by any present means available but sufficient to cause pain? There is no help from the analogy of metal fillings in teeth: despite the enormous physical punishment from daily repeated mastication, fillings cause no pain for many years unless they become obviously loose on examination. Is it possible that after all, this is a problem of bulky screw heads causing irritation to the erector spinae muscles and soft tissues moving over them? If so, why do we not see this problem more frequently in youngsters having extensive pedicle screw fixation for scoliosis?

Speculation is all we have for the moment. I cannot remember having this experience of patients going back to the days of fusion without internal fixation. That perception raises the question, a side issue here, as to how beneficial after all, has internal fixation been in the promotion of successful lumbar spine fusion, over and above old-fashioned external bracing of one kind or another. It remains my conviction that our biochemist grandchildren will recoil in horror at the news that their grandparents inserted screws and rods into unfortunate patients with backache. Advances in chemistry (BMP variants? Induction of disc ossification?) will very likely render internal fixation redundant.

We all know too well the textbook lists of persistent post-operative pain: pseudarthrosis, infection, loosening and breakage of fixation, adjacent level disc degeneration, the occasional poor choice of a patient determined not to get better, and other obvious explanations I may have omitted. These causes are not relevant to the small cohort of patients referred to in this discussion. The fascinating fact is that when I have raised this subject at professional gatherings large and small, and in discussions over coffee with colleagues, there has been a response, almost without fail, from fellow spine surgeons who have had patients similarly puzzling.

There is disappointingly little to find in the literature. The only textbook reference to the problem of undiagnosable late pain after lumbar fusion surgery has a small paragraph titled 'Painful Hardware' advising a cautious approach to implant removal.¹ Alanay *et al.*² record an average of 50% pain relief in all 20 patients

who had pedicle screw fixation removal from the lumbar spine for precisely the indications described above, in the presence of confirmed solid fusion. They reveal further that those patients who had a good result from local infiltration of lumbar trigger points pre-operatively, enjoyed a better post-removal result. They postulate an inflammatory process for the recurrence of late pain after initial surgery but offer no evidence in support. There were no cases of late pain to be found in the series of 49 cases of pedicle screw fixation and fusion for degenerative spondylolisthesis reported by Booth *et al.*³ except as the result of obvious complications and consequences. Hudyan *et al.*⁴ went looking for pedicle screw loosening in 38 patients with post-operative pain, using SPECT/CT. It is evident that some of their patients had no loosening, proven at subsequent surgery for removal of fixation, but the authors do not proceed to speculate further on these patients.

Some colleagues have dismissed the problem as 'metallosis', but metallosis is something quite else and not to be confused with the problem described in the context of this editorial. Metallosis is a condition arising mainly in chrome/cobalt meta-on-metal joint replacement prostheses, characterised by extensive peri-prosthetic soft tissue staining by shed metal particles, synovitis, loosening of implants, and erosion of bone. There may be systemic complications including haemolytic anaemia. Spinal metallosis presents most commonly with neural compression rather than recurrent back pain.⁵⁻⁸ Metallosis was first described in 1970 in relation to fracture fixation⁹ but an excellent recent review of the condition is available from Oliveira *et al.*¹⁰

Nature abhors a vacuum. So should spine surgeons. The late recurrence of low back pain after apparently successful spine fusion surgery with fixation constitutes a vacuum in our understanding of some part of the old bugbear of back pain. There is every chance that future advances in the chemical creation of spine fusion will render this vacuum irrelevant. In the meantime it is a problem to ponder, and research. It could be a fascinating project for an interested young surgeon in training.

References

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Note

- Please note that in the SA Orthopaedic Journal Winter 2016 (May) Vol 15 No 2, the names of the co-authors of the article, 'Early clinical outcomes of isolated low velocity gunshot radius fractures treated with closed reduction and locked intramedullary nailing' were inadvertently omitted. The full list is as follows:

**S Maqungo FC Ortho, NJ Kauta MBChB, R Dachs FC Ortho, G McCollum FC Ortho,
M Held FC Ortho, S Roche FCS(SA), Ortho**

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- In the same issue, 'Ulnar impaction syndrome: A case series and imaging approach', by Drs Liebenerg, Velleman and Suleman, please note that Dr MD Velleman is also affiliated to Section Sports Medicine, Faculty of Health Sciences, University of Pretoria