ROUNDUP360

Spine

Complications with anterior decompression and fusion

The two dichotomous approaches to treating patients with cervical region spinal stenosis are anterior cervical decompression with fusion (ACDF), and laminoplasty which effects decompression either anteriorly or posteriorly. In patients with ossification of the posterior longitudinal ligament (PLL) there are sporadic reports of higher complication rates than with the laminoplasty approach. Surgeons in **Tochigi (Japan)** set out to determine exactly what the complication rate was in a large retrospective series of patients undergoing ACDF (Level IV evidence). The researchers designed a multicentre study investigating the rates of early complications (within the first two weeks) in 150 patients operated on in 27 institutions. All patients underwent ACDF for cervical myelopathy secondary to cervical stenosis. Follow-up was to two weeks and all complications occurring post ACDF were recorded along with pre-operative imaging findings (Cobb angle and opacification of the PLL). The rate of lower limb neurological compromise was extremely low at 2% (3 patients), of which only one failed to recover. However, nearly 20 (15%) patients developed upper limb neurological compromise. Of these 20 patients, five had still not recovered at six months. The investigators identified that there was a strong association between canal occupancy and upper limb compromise. Other factors associated with compromise were greater blood loss and operative times, multi-level fusions and inadvertent CSF leaks. The authors performed a multivariant analysis and identified that high canal occupancy of the PLL and high volumes of blood loss were associated with a high chance of neurological deterioration.[1] This paper does not really answer the question the authors posed, as with no comparison group the authors have not confirmed higher rates of complications associated with ACDF or laminectomy. However, here at *360* we think there is much to make it commendable; it is a large, very generalisable series that clearly identifies those patients who are at risk of neurological compromise, making it a very useful paper.

Lumbar claudication and peripheral vascular disease

Traditionally, lumbar spinal stenosis and peripheral vascular disease have been seen as competing, although these are not mutually exclusive causes of intermittent claudication. The traditional teaching is that the diagnostic and interventional challenge is in distinguishing the two. However, given that both conditions affect the middle-aged and elderly population it is surprising that there is relatively little literature examining patients with co-existing conditions. Researchers from **Fukushima (Japan)** co-ordinated a multicentre study to examine the characteristics and treatment outcomes of patients presenting with lumbar spinal stenosis (LSS) and peripheral vascular disease (PVD). The researchers recruited 570 patients into the study, all of whom presented with symptoms of peripheral vascular disease. Patients were recruited from 64 different institutions, based on the findings of a standardised diagnostic tool and an MRI suggestive of LSS. Data were collected concerning history, examination findings, ankle brachial pressure index (ABPI) and scores (clinical and quality of life measures). The researchers identified a subgroup of 38 patients (6.7%) who had diagnostic criteria for both LSS and PVD, of whom 53% (20) were previously known to have PVD. While there was improvement in both functional and quality of life scores in both groups, those patients without PVD did statistically significantly better than those without. The research team identified that advanced age, diabetes and a cardiovascular history were all associated with the co-existence of PVD and LSS.[2] The relatively low rate of co-existence of LSS and PVD in this series is interesting, and we were surprised to read this finding here at *360*. This may in part be explained by a risk of selection bias. We were similarly surprised to see that 64 units recruited just 570 patients, which equates to less than nine patients per unit. However, the finding that patients with pre-existing vascular claudication can benefit from lumbar spine decompression (but not as much as their peers) is valuable information.

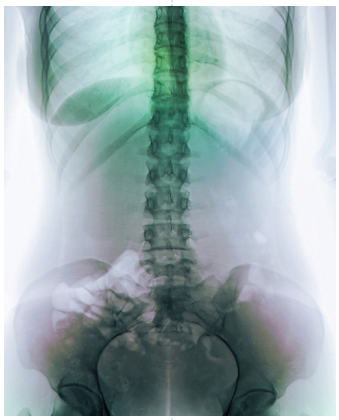
Increasing cervical instability in patients with rheumatoid arthritis

One of the most serious complications of rheumatoid arthritis is the development of cervical spine involvement which is, due to the combination of bony erosion and ligamentous laxity, often associated with cervical spinal instability. The association is well known, but the natural history and incidence is not well described. A prospective population study (Level III evidence) has been undertaken in **Kobe (Japan)** over a five-year period to study the development of spinal instability in 140 patients with rheumatoid arthritis. At recruitment none of the patients had signs or symptoms of cervical spinal involvement and all had symptoms of classic rheumatoid arthritis. The researchers followed-up the patients with regular radiographs and monitored them for three types of instability: atlanto-axial subluxation (AAS, atlanto-dens interval > 3 mm), vertical subluxation (VS, Ranawat score < 13 mm) and subaxial subluxation (SAS fixed translation > 2 mm). During the study period over 40% of patients developed spinal instability. The most common was AAS (32%) followed by SAS (16%) and VS (11%), with nearly 13% of patients developing an instability the researchers graded as severe, most commonly in VS and SAS. A small subset (4.3%) presented with symptoms of canal stenosis due to their instability. The researchers identified corticosteroid use and severe

bony erosion at presentation to be associated with the development of severe instability.[3] The research team have identified the relatively common occurrence of the development of spinal instability in rheumatoid patients with over 40% developing signs of instability during the study period. We were interested to see the higher rate of severe instability (and associated symptoms) in patients with VS and SAS type instabilities.

Kyphoplasty: short-term benefit only

Kyphoplasty is a controversial treatment, with proponents arguing that the restoration of vertebral height and normal spinal biomechanics is advantageous. However, vertebral insufficiency fractures present with acute pain and a natural history of gradual amelioration. Detractors argue that, as symptoms will subside if left alone, the risks of kyphoplasty do not outweigh the benefits. Despite garnering much debate there is little evidence looking at the longer-term outcomes of kyphoplasty. A research team in **Seoul (South Korea)** aimed to discover this. The study team designed a prospective comparative series (Level II evidence) to compare kyphoplasty with conservative treatment modalities. The investigation included 259 patients with one or more painful osteoporotic wedge fracture (OWF) confirmed by MRI. Patients were enrolled at onset of symptoms, and in those in whom symptoms had not subsided by three weeks, kyphoplasty was performed. A total of 91 patients failed the initial trial of conservative treatment, and outcomes were assessed in both groups using a VAS pain score, progression of collapse and the Oswestry Disability Index (ODI). Study participants were stratified according to age, gender, level of fracture, number of fractures, bone mineral density and body mass index. Outcomes were assessed at regular intervals up to 12 months following the onset of symptoms. Over 65% of patients were treated successfully with conservative measures. The study team found failure of conservative treatment was associated with older age (> 78), poor BMD (t < -2.95), high BMI (> 25), and a higher risk of collapse (> 28%). However, the study team noted that there were significant improvements in pain and outcome scores at each follow-up visit. The kyphoplasty group showed improved clinical outcomes during the first month, but after three months there were no differences between the groups.[4] In light of the study findings it seems to us all here at *360* that for patients without risk factors of failure, conservative management should be given a go considering that at 12 weeks the results are equivalent. This study is a real gem. Not only do the investigators identify the outcomes of both treatments, but also tell us which patients (older, heavier patients with poor bone mineral index) will benefit from the intervention.



How tight is tight? Cervical stenosis revisited

The salvation and damnation of spinal surgeons the world over has been the advent of 3D CT and MRI, with accurate visualisation of the bony and soft-tissue elements of the spine and spinal canal facilitating ever more accurate diagnosis of spinal pathology. However, despite seeming to represent the panacea for spinal diagnosis, the scans, sadly, are not always right. A high false-positive rate and difficulties in diagnosing spinal stenosis are the most common obstacles to reaching a clear and accurate radiological diagnosis for patients complaining of spinal or radicular symptoms. One of the key difficulties is a poor understanding of normal cervical anatomy, making diagnosis of stenosis problematic. Investigators in **Garfield Heights (USA)** have designed and executed one of the most complete cadaveric anatomical studies ever undertaken in an attempt to define the normal cervical anatomy on a large sample of normal cadavers. The investigative team used 1066 skeletally normal specimens from a natural history collection, and callipers were used to measure canal diameter, interpedicular distance and pedicle length. They defined a stenotic canal as one with measurements more than two standard deviations from normal. Having established normal values for canal diameters (C3/4 1.82 cm^2, C4/5 1.80 cm^2, C5/6 1.84 cm^2, C6/7 1.89 cm^2, C7/T1 1.88 cm^2), the researchers conducted a multiple regression analysis which confirmed that there was a significant association between spinal cord diameter (< 13 mm) and interpedicular distance (< 22.5 mm), giving sensitivities and specificities in excess of 90% and odds ratios > 18 at each level.[5] The research team venture that they have identified for the first time the normal range of spinal canal anatomy, and further, that in patients with spinal cord diameter of < 13 mm and interpedicular distances of > 22 mm the patient is statistically unlikely to suffer spinal stenosis.

Exercise or fusion for chronic lower back pain?

The heart sinks in every spinal surgeon's clinic when a back ache patient attends. Isolated back pain with no peripheral neurological symptoms is a very challenging condition to treat. The vast array of symptoms, functional and psychological overlap requires a truly multidisciplinary approach, but even in the most evolved of spinal services returning patients to normal function can be an impossible challenge. In these difficult circumstances there is a true dichotomy, with some surgeons shying away from any surgical intervention and others performing a range of fusion or stabilisation procedures. Recognising the complexity of the problem and the need for long-term outcome data, surgeons in **Oslo (Norway)** designed a randomised controlled trial (Level I evidence) to ascertain the efficacy of surgical fusion for chronic lower back pain (CLP). Outcomes were assessed with the Oswestry Disability Index (ODI) with secondary outcomes of pain, fear avoidance, core muscle strength, work status and medication requirements. Patients were recruited from both the spinal and neurosurgical departments over a three-year period and follow-up was to nine years. The researchers enrolled 124 patients into the study who were randomised either to lumbar spine fusion or an exercise and rehabilitation protocol. At final follow-up, over a third of nonoperative patients had crossed over to the operative group, and over a third of patients allocated to primary surgery had undergone further surgery. At final follow-up there was no significant difference found between groups in ODI (although both groups had significantly less disability than at baseline by four years). Only a third of patients had returned to work, but there was a difference in the rate of return to work favouring patients who had undergone cognitive behavioural therapy.[6] This study highlights the difficulties of studying complex interventions in a randomised controlled trial. Although well designed and set up, the results were muddied by the high rates of crossover and reintervention in the participants. Despite these limitations we were impressed with the thoroughness of the analysis, here at *360*, and would wholeheartedly recommend you devoting ten minutes of your time to read the whole paper.

Lumbar disc arthroplasty and adjacent level changes

The consequences of adjacent level changes following intervention at a single spinal level are well documented. One of the cited advantages of lumbar disc arthroplasty is that maintenance of height and normal biomechanics should minimise adjacent segment disease and maintain movement. This is an inviting proposition, if the professed benefits of arthroplasty are true. Surgeons from **Oslo (Norway)** set out to test this theory through a randomised controlled trial (Level I evidence). Patients with degenerative disc disease were randomised to either prosthetic disc replacement or conservative treatment. The study was designed to establish the impact of the intervention on subsequent same-level facet degeneration (FD) and adjacent segment degeneration (ASD). The research team enrolled 116 patients who each had low back pain, degenerative change in a maximum of two lumbar segments and an Oswestry Disability Index (ODI) of at least 30. Patients were followed up for a minimum of two years. The investigative team identified no differences in rates of ASD, based on review by three independent observers between patients with and without arthroplasty. However, the study team identified a significantly higher rate of FD in patients treated with arthroplasty (34% *versus* 4%), although these changes were not seen to be related to outcome.[7] In the controversial world of experimental arthroplasty, none has been quite as controversial as that of lumbar and cervical disc replacements. The literature is dotted with stories of great success and catastrophic failures; after all, there is more to lose in an operation when the accepted complications include paralysis. This paper adds important information; if there is little long-term benefit in preventing subsequent degeneration, then certainly our experts at *360* agree that they won't be offering their patients spinal arthroplasty for the foreseeable future.

Obese disc prolapses

We did wonder at *360* HQ if the SPORT investigators were starting to flog a dead horse, as yet another report from the Spine Patient Outcomes Research Trial crossed our desks in the preparation of this issue. However, yet again it does appear that the SPORT research team have pulled it out of the bag. Researchers in **Philadelphia (USA)** have performed a retrospective analysis of some of the subgroup data collected during the SPORT study in the hope of determining if treatment outcomes are affected by pre-operative obesity in patients presenting with lumbar spinal stenosis or spondylolisthesis. The researchers are not presenting randomised data, but a prospective comparative series (Level II). The study included 1235 patients, 749 non-obese (BMI < 30) and 486 obese (BMI > 30). Baseline characteristics and regular follow-up visits to four years were used to determine any differences in functional outcomes between the groups for both types of surgery. There were significant improvements over baseline in both obese and non-obese patients undergoing surgery for stenosis and spondylolisthesis, and in patients with the latter, obesity had no impact on complication or re-operation rates. However, obese patients undergoing stenosis surgery had significantly higher rates of complication (5% *versus* 1%) and re-operation (20% *versus* 11%) when compared with their normal weight peers. Although there was improvement in outcomes in the obese spondylolisthesis group, the SF36 scores did not improve as markedly as in normal weight patients. The most striking finding of the study, however, was how poorly obese patients did with conservative treatment. The obese patients had a significantly greater treatment effect when measured with both the ODI for both stenotic and spondylolisthesis surgery.[8] It does seem that in almost every branch of orthopaedics and traumatology, larger patients cause larger problems in terms of decision making and complications. The SPORT investigators continue to add valuable information to the world literature. We now know that because obese patients do so poorly with conservative treatment, and despite higher complication rates, operative intervention can be justified for degenerative lumbar spine problems. We do wonder here at *360*, however, how the complication profile and treatment effects would look if the same larger patients undertook a programme of diet and exercise prior to their surgery.

REFERENCES

1. **Kimura A, Seichi A, Hoshino Y, et al.** Perioperative complications of anterior cervical decompression with fusion in patients with ossification of the posterior longitudinal ligament: a retrospective, multi-institutional study. *J Orthop Sci* 2012;17:667-672.
2. **Uesugi K, Sekiguchi M, Kikuchi S, et al.** Lumbar spinal stenosis associated with peripheral arterial disease: a prospective multicenter observational study. *J Orthop Sci* 2012;17:673-681.
3. **Yurube T, Sumi M, Nishida K, et al.** Incidence and aggravation of cervical spine instabilities in rheumatoid arthritis: a prospective minimum 5-year follow-up study of patients initially without cervical involvement. *Spine (Phila Pa 1976)* 2012;37:2136-2144.
4. **Lee HM, Park SY, Lee SH, Suh SW, Hong JY.** Comparative analysis of clinical outcomes in patients with osteoporotic vertebral compression fractures (OVCFs): conservative treatment versus balloon kyphoplasty. *Spine J* 2012;12:998-1005.
5. **Bajwa NS, Toy JO, Young EY, Ahn NU.** Establishment of parameters for congenital stenosis of the cervical spine: an anatomic descriptive analysis of 1066 cadaveric specimens. *Eur Spine J* 2012;21:2467-2474.
6. **Froholdt A, Reikeraas O, Holm I, Keller A, Brox JI.** No difference in 9-year outcome in CLBP patients randomized to lumbar fusion versus cognitive intervention and exercises. *Eur Spine J* 2012;21:2531-2538.
7. **Hellum C, Berg L, Gjertsen O, et al.** Adjacent level degeneration and facet arthropathy after disc prosthesis surgery or rehabilitation in patients with chronic low back pain and degenerative disc: second report of a randomized study. *Spine (Phila Pa 1976)* 2012;37:2063-2073.
8. **Rihn JA, Radcliff K, Hilibrand AS, et al.** Does obesity affect outcomes of treatment for lumbar stenosis and degenerative spondylolisthesis? Analysis of the Spine Patient Outcomes Research Trial (SPORT). *Spine (Phila Pa 1976)* 2012;37:1933-1946.