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MINI-SYMPOSIUM: FRONTIERS IN SPINE SURGERY

(ii) The role of surgery in low back pain

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Summary
Spinal fusion for low back pain (LBP) in the absence of serious underlying disease is controversial. The cause of serious LBP illness is not well understood, there is poor correlation of the presence and degree of degenerative changes with symptoms and non-structural factors such as central pain intolerance, psychological distress, social and economic issues of compensation and participation, appear to act as co-morbidities to LBP illness. Fusion surgery appears to offer only limited relative benefits over cognitive behavioural therapy and intensive rehabilitation in RCTs of surgical vs. non-operative care. At best, possibly 50% of fusion patients in this setting have high-quality outcomes. Artificial disc replacement has approximately the same outcomes as fusion in short-term studies but the long-term risks of prosthesis placement in relatively young patients is a concern. Future surgical advances may be limited by a lack of clear diagnostic certainty and the high prevalence of serious co-morbidities that impair recovery.

Introduction

Low back pain is common. Most episodes of LBP resolve without medical intervention; acute back pain will usually resolve in short order, but recurrent episodes are very common and persistent low-grade symptoms can be found years after the first episodes. The point prevalence and one-year prevalence of LBP may be as high as 33%,[1] and 73%,[2] respectively. In physically active adults such as manual labourers or soldiers undergoing physical training, the experience of LBP may be still higher or nearly universal.[3] However, most people with persistent LBP do not report serious or persistent disability. While more than 70% of adults in a large population study reported back pain, only 10% had more than minimal functional problems.[4] Even in persons with co-morbidities for development of disability, only less than 10% experienced any work loss greater than one week over a five years prospective observation.[5]

Surgical strategies for low back pain must be considered in the context of the presumed cause and course of the LBP syndrome being treated. The more specific and definitive the pathology, the easier the decision-making and the more predictable the outcome. For example, a patient with persistent LBP may have a relatively straightforward medical history and clear imaging pathology or, at the other extreme, no clear pathologic findings and a complex, chaotic emotional and social situation precluding reliable assessment.

In this context, for the surgeon evaluating a patient with back pain the issue is not why someone might have backache, because backache of varying intensities is so common. Rather the real question is why common backache

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is such a serious problem for this particular person. The answer may be simple when investigation demonstrates a destructive process such as myeloma, discitis or clear deformity and instability. However, more commonly the cause of the apparently severe LBP illness is obscure.

Persistent LBP and lumbar spine degeneration

While serious structural diseases of the spine may require complex and invasive treatment strategies, the overwhelming majority of persons with LBP will have non-specific findings rather than serious pathology on imaging studies. In clinical studies of patients with established LBP syndromes structural findings of disc degeneration,[6] annular disruption[6–8] and endplate changes[9,10] are often seen. However, it is impossible to draw conclusions regarding the relationship of these findings to the complaint. In cross-sectional studies of subjects asymptomatic for serious LBP problems, MRI findings of disc degeneration, annular fissures and facet arthrosis have been commonly reported[8,11,12] (Fig. 1). From a population point of view, someone with even advanced structural changes, such as disc degeneration or an annular fissure, is much more likely to be doing just fine than having serious LBP illness.

Prospective studies of MRI in subjects without serious LBP problems at baseline found that the subsequent development of LBP problems correlated poorly or not at all with baseline MRI findings.[5,13–15] Rather future LBP troubles were most strongly predicted by psychological factors, social or occupational factors, or other chronic pain processes. Furthermore, in studies in which MR images are taken at baseline and repeated after 3 or more years, the new MRI findings developing over time were not well correlated with the development of new symptom-type or severity.[13,14] In a different study design, subjects with known baseline degenerative changes during a stable and prolonged asymptomatic period, have been re-imaged soon after serious LBP episodes.[16] This study design shows that new significant findings were very uncommon ($<5\%$), suggesting that even serious LBP episodes are not due to any gross structural change in vast majority of cases. In fact, when a patient develops a serious disabling LBP episode, the likelihood of finding a *de novo* development of any of the lumbar findings commonly assumed to be associated with a ''disc injury'' is small, generally less than 20% (Fig. 2).

Special testing

Because physical examination and even detailed imaging techniques have not found spinal pathology specific to those patients with serious LBP illness, attempts have been made to identify a hypothetical primary-symptomatic structure (''pain generator'') using provocative injections and anaesthetic blockade. The validity of these tests is not known as there is no histopathologic 'gold standard' against which a positive result could be tested. The issues of regional or central hyperalgesia, placebo or idiosyncratic responses are clearly important but not well quantified. Thus the results of these special diagnostic tests should be carefully considered in their clinical context. This is particularly true of provocative discography which is used to direct most types of invasive treatments (percutaneous disc interventions, fusion and disc arthroplasty). This tests the response of a patient when dye is injected into an intervertebral disc. If an injected, disrupted disc is painful and the pain is similar or exactly like a patient's usual LBP, proponents have suggested that this result has definitively identified the cause of a patient's pain. However, it has been shown that disc injection can simulate a quality and location of pain known not to originate from that disc (e.g. pelvic pain, bone tumour).[17,18] Furthermore, disc injections are frequently painful (30–80%) in certain asymptomatic subjects, especially in the presence of psychological distress, previous disc surgery, remote chronic pain processes, or disputed compensation[19,20] (Fig. 3). As most patients with chronic LBP illness have one or more of these co-morbidities, the risk of false positive results may be high in those individuals.

Even in subjects without co-morbidities a positive ''best-case'' discography injection (low pressure, annular disruption, negative adjacent discs, and normal psychosocial dimensions) results may still not accurately demonstrate which subject will have a high quality outcome from removing the supposed ''pain generator''. A study was performed to evaluate diagnostic validity of discography in this best-case situation. Despite these ''ideal'' subjects achieving a solid fusion after anterior discectomy, less that half of these subjects had high-grade relief of symptoms.

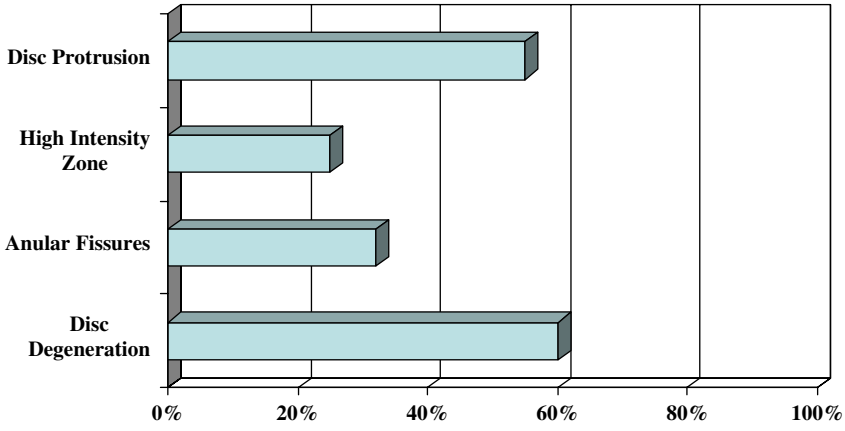

Figure 1 Prevalence of common changes on lumbar MR in adult subjects without serious LBP illness.