The Michel Benoist and Robert Mulholland Yearly European Spine Journal Review: a survey of the “medical” articles in the European Spine Journal, 2011

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Received: 13 December 2011 / Accepted: 13 December 2011 / Published online: 22 December 2011
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Introduction

Eight years have now gone by since the editors of ESJ first asked Bob Mulholland and me to take a fresh end-of-the-year look at the articles appearing in the latest volume of the Journal, and to do a critical review of a selection of the papers. From the start it was clearly established that our choice of articles was in no way a ranking, but rather recognition that in addition to their excellence, the selected papers could contribute to presenting new information, provoking discussion and furthering research. Regarding research, in an editorial by Maurits van Tulder, Deputy Editor, the European Spine Journal called attention to and recognized an important domain of scientific research: economic evaluations of surgical and medical interventions, whether new or already existing. In addition to ascertaining effectiveness, it is essential to distinguish between the cost-

effective and the non-cost-effective procedures via an appropriate methodology. Economic evaluation is necessary for the appropriate use of the financial resources of our health care systems. Clearly, spine research should comprise health technology assessment—a vast domain of activity.

Basics

The paper by Gantenbein-Ritter et al. [14] in the June issue deals with biological disc regeneration and more precisely with application of autologous stem cells. Mesenchymal stem cells are relatively easily obtained from various tissues and are promising candidates to differentiate into potentially IVD-like cells. Because of the metabolic conditions of the intervertebral space, the stem cells injected in degenerated discal tissue have little chance of survival. The cells must be “preconditioned towards IVD-like phenotype”. Co-culture with nucleus pulposus cells and application of growth factors have been demonstrated to induce chondrogenic gene expression. The authors then point out that in spite of similarities between chondrocyte and disc cells, there are important differences in the composition of disc and cartilage. In order to differentiate the chondrogenic type from the IVD-like phenotype, cytokeratin 19 (KRT-19) has been shown to be a potential phenotype marker to differentiate nucleus pulposus cells from articular cells. In a very sophisticated study, the authors present the results of an in vitro cell culture of human stem cells exposed to standard chondrogenic stimulus (TGF-Beta) and to another growth factor of the TGF family—GDF-5, a potential candidate for a discogenic pathway. According to the results, the authors conclude that GDF-5 could indeed induce differentiation of stem cells into the discogenic line, which, in turn, could be considered for IVD tissue engineering and in vitro

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therapeutic applications. They also conclude that KRT-19 regulation can be a useful molecular marker between the chondrogenic and IVD-like differentiation.

Animal models to study disc degeneration and repair after injection of bioactive substances in the disc are necessary tools to develop systems, which could finally be applicable to humans. The paper by Jim et al. [18] in the August issue deals with a novel model disc organ culture. Discs were isolated from bovine, which have similar structure to humans with the same barriers of nutrient diffusion. Discs were isolated using three different techniques: NEP without the endplates; BEP retaining bony endplates; or CEP retaining only cartilage endplates. An injection of a moderate dose of trypsin was performed in the center of the disc to induce degeneration and cell viability in culture. When using discs retaining only the cartilage endplate (CEP), the morphology of the disc was maintained in culture at least 4 weeks and over 75% of the cells were still viable. Loss of proteoglycans, marker of degeneration, was obtained with maintenance of active cells. When TGF Beta was injected into the disc culture in order to judge the possibility of repair, proteoglycan synthesis almost doubled, demonstrating the activity of TGF Beta. The authors conclude that the CEP model provides a model system for studying repair of the degenerate disc.

The capacity of mesenchymal stem cells (MSCs) to differentiate into intervertebral disc-like cells (IVD-like) and to proliferate rapidly is at the origin of studies where MSCs are used to repair the damaged intervertebral disc tissue. However, studies have also shown that the activity of MSCs is not only related to their capacity to stimulate the process of repair but also to their capacity to act on the surrounding tissues by complex mechanisms. The objective of the study by Bertolo et al. [5] published in the April issue was to evaluate in vitro the immunosuppressive effect of MSCs on disc fragments harvested in patients undergoing discal surgery. The authors noticed the presence of IgG produced by infiltrating lymphocytes. They further demonstrated that co-culture in vitro of mesenchymal stem cells with IVD fragments and peripheral blood lymphocytes reduced inflammation expressed as diminution of IgG production and of peripheral blood lymphocytes. The authors also describe and comment on the complex gene expression of anti-inflammatory cytokines. One can speculate with the authors a potential therapeutic application of MSCs related to their capacity to repair and also to their anti-inflammatory properties.

Etiology of adolescent idiopathic scoliosis

The etiology and pathophysiology of adolescent idiopathic scoliosis (IS) are still unknown. IS is generally considered

as a multifactorial disorder. However, some studies suggest that abnormalities of sensorimotor integration could contribute to the cause of IS. The study by Domenech et al. [10] reported in the July issue used functional magnetic resonance imaging to evaluate cortical and subcortical function in patients with IS. The authors hypothesized that as in idiopathic dystonia, an abnormal cortical sensorimotor integration may underlie the pathogenesis of idiopathic scoliosis. To validate this hypothesis, the authors performed functional cerebral MRI (fMRI) in ten adolescents and ten controls. Cortical sensorimotor activation was studied at rest and during a motor task (opening and closing the hand at a rate of 1 Hz). Compared to controls and with rest, IS patients showed a significant hyperactivation of the contralateral supplementary motor area (SMA) when performing the motor task with either hand. There was no hyperactivation in other sensorimotor cortical areas.

The SMA is known to be involved in preparation, initiation and execution of voluntary movement and also in posture control. SMA receives inputs from somatosensory cortex and basal ganglia and sends outputs to primary motor cortex and spinal cord. Although it is difficult to assert that this SMA hyperactivation is the cause or the consequence of IS, this is the first study with fMRI in IS patients, which demonstrates an increased activation in motor-related control areas. These findings support the hypothesis that a sensorimotor integration underlies the pathogenesis of IS. In addition, as suggested by the authors, these abnormal MRI findings may represent a biomarker of IS disease and open the way for novel therapeutic targets. This paper, winner of the EuroSpine Full Paper Award for 2010, has limitations, which have been summarized in a Reviewer's Comment by Freeman [12].

Imaging

The paper by Cho et al. [8] in the December issue is a prospective study investigating whether the presence of intra-medullary signal intensity (SI) and contrast gadolinium-DTPA enhancement are associated with post-operative prognosis in cervical compressive myelopathy. Seventy-four patients with ventral cord compression (discal herniation 26; spondylotic 48) underwent an anterior cervical discectomy and fusion (ACDF). Neurological outcomes were improved in all the patients, as measured by the pre- and post-operative JOA score. Pre-operatively, 50 out of 74 patients had increased signal intensity on T2-weighted MRI; 16 of these 50 patients also had gadolinium enhancement, defined as a clear demarcation of SI from the surrounding cord parenchyma. Post-operative JOA scores and recovery ratios were compared, distinguishing three groups according to the presence of SI and of gadolinium

enhancement: group A—no SI; group B—high SI on T2-weighted images; group C—similar to group B but with an enhanced contrast image. Significant differences in post-operative JOA scores and recovery ratios were found between the three groups. Intra-medullary SI was a poor prognostic factor, and contrast enhancement was the worst prognostic factor in this series. In patients with pre-operative cord signal changes, follow-up MRIs were performed at 3, 6 and 12 months post-operatively. The reversal rate of the signal change in patients in group B showed greater reversal changes than in patients with contrast enhancement. This paper contains a good discussion and review of the literature. It demonstrates the usefulness of gadolinium enhancement and post-operative MRIs for evaluating the prognosis.

The paper by Song et al. [33] in the March issue emphasizes the interest of diffusion tensor imaging (DTI) in the evaluation of the spinal cord in compressive cervical myelopathy. The authors performed a prospective study in 53 patients with clinical manifestations of myelopathy, and in 20 healthy volunteers. They further compared the results of conventional MRI with those obtained by DTI. Interestingly, hyperintensity on T2-weighted images was seen in only 24 patients on traditional MRI, while patchy-colored signals on the cord were shown in 39 cases when using DTI. This study confirms the results of previous studies showing that DTI can detect early alterations of the cord lesions. No abnormalities of DTI were seen on normal volunteers and the location of the patchy-colored signals correlated well with the clinical data. The authors provide a thorough discussion of the increased intra-medullary diffusion coefficient. There is a good description of the technique and a complete review of the literature. The conclusion of the article is that DTI of the spinal cord is still inferior to that of the brain, for which DTIs were initially performed. However, in the present state of the art DTI can already show intra-medullary microstructure and more lesions than MRI, especially in the early stages of the myelopathy.

There is an interesting article in the March issue by Kilshaw et al. [21] dealing with abnormalities of the lumbar spine seen in the coronal plane on plain radiographs. The objective of this study was to evaluate the prevalence of abnormalities on plain abdominal radiographs with respect to age and sex. The study focused on degenerative scoliosis and lateral listhesis, which can be a cause of low-back and radicular pain in the aging population. Two of the authors reviewed 2,765 abdominal radiographs, assessing the presence of scoliosis (Cobb angle $>10^\circ$), lateral listhesis and osteoarthritis. Radiographs were then grouped into 10-year age brackets, starting from age 20 to age 90 or more. The prevalence of

scoliosis and of lateral listhesis increases with age and is greater in women than in men. For example, whereas the prevalence of scoliosis is 6% and lateral listhesis is 2.6% in the 60- to 69-age bracket, it is 23.9% for scoliosis and 22.9% for lateral listhesis at 80 or over. Speculative causes of degenerative scoliosis are evoked with appropriate references.

The significance of the presence of gas in a fractured collapsed vertebral body is still controversial. The study by Feng et al. [11] in the August issue presents interesting information as it is based on a large number of cases. The authors have retrospectively reviewed plain radiographs from 4 groups of patients: 328 osteoporotic vertebral collapse, 317 spinal infections, 302 metastatic fractures, and 325 myelomas. In all cases, the cause of the collapse had been established and confirmed on appropriate usual criteria. The incidence of vacuum phenomena in the collapsed vertebra was defined by the presence of intraosseous gas accumulation in the vertebral body, as seen in both the anterior and posterior view. The presence of gas was observed in 18.86% of the osteoporotic fractures. Five patterns are described and illustrated in the text: linear, band, triangular, cloud, and multiple-linear types. Only one case of vacuum phenomena was detected in a spinal infection by tuberculosis, none in patients with metastatic fractures, and a 6.4% incidence in patients with multiple myeloma. Because of this last finding, the search for the possibility of a myeloma should be systematically performed when faced with a collapsed vertebra, even with vacuum phenomena.

Ankylosing Spondylitis

The study by Anwar et al. [3] in the March issue is a good reminder of the difficulty in detecting cervical spine injuries in long-standing ankylosing spondylitis. The authors retrospectively report a case series of 32 patients with AS and cervical fractures. Fall was the most frequent cause of the fracture, usually located below C5. In the majority of patients, the fractures were unstable through the vertebral body or the calcified ligaments or with displacement of the fragments. The most important message of the paper is that at presentation, often delayed by between 12 and 72 h or more, the initial radiographs were considered as normal. The fracture dislocation could only be detected on CT or MRI. Fifteen patients were neurologically intact at the time of injury but deteriorated later and developed complete cord injury. The conclusion of the study was that patients with ankylosing spondylitis and cervical injury should be examined in emergency and benefit from a CT scanning of the cervical spine.

Spine Tango “Conservative”

The article by Kessler et al. [20], which appeared in the March issue brings good news for the medical “spine community”. This study reports on the development of a documentation instrument for the conservative treatment of spinal disorders in an international spine registry. “Spine Tango Conservative” was developed by the authors along with a group of international experts in spinal pathology, using the Delphi consensus method. This new registry has been developed in the framework of an already existing international spine registry, recording surgical spinal interventions and promoted by the Spine Society of Europe [1]. In addition to presenting the methodology used for the development of this new registry, this paper provides a prospective feasibility study assessing a group of 97 patients, treated conservatively for neck and low-back pain with descriptive data and results. Spine Tango Conservative is the first and unique instrument dealing with conservative therapies. Its future relies on the database collected by practitioners from different participating countries. The usefulness of registries has been demonstrated by the already existing surgical registries. In addition, with RCTs, which have their own limitations, registries will be an effective system for documentation and evaluation of non-surgical treatments and interventions and their results. This reviewer advises readers of ESJ to look carefully at this article and to spread the information that a new and useful tool has been created.

Health technology assessment

A very important and useful editorial by M. van Tulder [37] concerning economic evaluations of orthopedic devices and interventions as well as of medical procedures can be found in the July issue. The costs of health care have been increasing regularly over the years and one can anticipate that the social security systems will sooner or later no longer be able to cover all the new or already existing interventions unless societies are willing to indefinitely increase the health budget out of the gross national product. It is therefore essential to distinguish the cost-effective procedures from the non-effective ones. As pointed out by the author, in most European countries new drugs are reimbursed only if it has been proven that they are effective, safe and cost-effective compared to existing medications. Curiously, new orthopedic devices or interventions or medical procedures can be introduced without having been evaluated by adequate trials. Some of them disappear over the years when the clinical experience discloses their inefficacy or the high rate of complications. In the meantime, patients have undergone inappropriate care

in spite of high societal expenditures. The author clearly describes the types and methods of economic evaluations, and stresses the importance of professionally evaluating the cost-effectiveness of the various procedures along with high-quality randomized trials. I highly recommend a careful reading of this editorial.

In the same issue of the Journal three other papers deal with economic evaluation. In a randomized controlled trial with two-year follow-up, Fritzell et al. [13] have evaluated the cost-effectiveness of disc prosthesis versus lumbar fusion. This paper is a high-quality economic evaluation, using the clinical data reported in a previous study by Berg et al. [4]. The purpose of the present study was (1) to compare the costs associated with disc prosthesis with those of a lumbar fusion, and (2) to compare the cost-effectiveness of the two procedures using the EQ-5D. In terms of costs and from the societal perspective, there was no significant difference between TDR and the instrumented fusion. However, from the health care perspective, there was a significant difference in favor of TDR, related to more re-interventions in the fusion group. In terms of quality of life evaluated in Qalys, TDR was associated with a small gain when compared with fusion. I strongly recommend a careful reading of this paper, which is a model of economic evaluation.

An article by Lin et al. [25] provides a high-quality systematic review exploring the cost-effectiveness of general practice care for sub-acute and chronic back pain. This paper should have an important impact on clinical practice as the authors conclude that cost-effectiveness of GP care can be improved by referring patients to additional services such as advice, exercise, behavioral counseling or occupational rehabilitation.

The other article by Lin et al. [26] is a high-quality systematic review investigating the cost-effectiveness of guideline-endorsed treatments for LBP. Economic evaluations have been performed alongside RCTs, investigating treatments for LBP endorsed by a recent clinical practice guideline issued by the American College of Physicians and the American Pain Society. The review based on 26 articles found that among the treatments endorsed by the guideline, evidence of cost-effectiveness was limited to interdisciplinary rehabilitation, exercise, spinal manipulation, acupuncture and cognitive behavioral therapy.

Coccygodynia

A review of the literature concerning the surgical treatment of coccygodynia can be found in the May issue. Surgery for coccygodynia is usually not considered a very effective operation. The article by Karadimas et al. [19] may change this reputation. In their review, the authors

were able to analyze 24 papers reporting results and complications of surgical resection of the coccyx. A summary is provided of the various techniques. The majority of the reviewed articles were retrospective, with only two of them being prospective. Level of evidence was IV in most papers and III in only five of them. A comprehensive table presents the main data, including etiology (principally trauma), gender (predominantly female) and age. The percentage of effectiveness of each study is tabulated. In total, 504 out of 671 patients reported good or excellent results. Local infection is the main complication. The authors wisely remind the reader that a diagnostic work up is necessary for the differential diagnosis; they also stress that surgery should only be considered after failure of conservative treatment: injections, coccyx manipulation, physiotherapy, and medications. Despite the limitations summarized in the paper, interesting information is provided in this article.

Vertebroplasty

In the August issue, an interesting study by Brodano et al. [6], coming from the Rizzoli Institute, reports on the benefits and the risks of vertebroplasty. It is a retrospective study of 59 patients (94 fractured levels) who underwent percutaneous vertebroplasty for osteoporotic vertebral fractures. The mean age of the patients was 75 years. Fractures were classified as A1 type according to the Magerl classification. There was no neurologic involvement. According to the protocol of this institute, aiming at early mobilization, all the patients were initially treated by bracing and analgesics. A limited group of 24 patients, who did not tolerate bracing and could not ambulate because of acute pain, was treated within 2 weeks after the fracture. The other group of patients, able to ambulate with bracing and analgesics, were clinically evaluated after 45 days and underwent an MRI. Correlation at that time of persistent pain and of hyperintense signal in T2-weighted images was disclosed in 35 patients who were considered a failure of conservative treatment and therefore underwent vertebroplasty. Pre- and post-operatively, outcome measures included VAS, SF36 and Oswestry disability index. In the immediate post-operative course, significant pain relief was found in 39 patients (66.1%), moderate pain relief in 17 (28.8%) and no effect in the three remaining patients. Pain intensity and quality of life remained satisfactory after the procedure with a mean follow-up of 16 months. There was no complication. The article contains a good discussion of the literature, especially of the two recent well-known randomized placebo-controlled trials, reporting no significant difference between vertebroplasty and a sham procedure.

Sleep and back pain

Sleep disturbances in LBP patients have already been reported in a few studies. However, most of these studies concerned selected groups of patients with a limited number of individuals. The originality of the cross-sectional study by Alssadi et al. [2] in the May issue comes from the study design. The authors obtained data from 1,941 patients with low-back pain, extracted from 13 studies previously conducted by the same group or colleagues. Studies were eligible for inclusion in the review if they contained “I sleep less well because of my back”, an item found in the Roland and Morris questionnaire. The authors were able to calculate the prevalence of poor sleep in a large number of patients (1,128). The prevalence was estimated at 58.9%, which is higher than in previous studies. The authors also aimed to determine whether poor sleep was associated with the duration and intensity of pain. Concerning duration, the rates of sleep disturbances were high in acute LBP (63%) as well as in persistent pain (57%), indicating that poor sleep is not related to chronicity. Concerning pain intensity, the authors found a weak association: an increase in pain intensity by one point on the NRS was associated with a 10% increase in the likelihood of reporting sleep disturbance. It is well known that poor sleep can induce many physiological and psychological effects such as fatigue, low mood, anxiety and depression, all factors capable of influencing pain persistence. In clinical practice, the presence of sleep disturbances should be considered and treated accordingly.

Management of sciatica

The paper by Jacobs et al. [17] published in the April issue is a high-quality Cochran systematic review, comparing surgery with conservative treatment in the management of sciatica due to a lumbar disc herniation. With a perfect methodology, including risk-of-bias assessments, the authors extracted and assessed five studies out of 2,383 citations. Inclusion criteria of the five studies were RCTs of adults with sciatica, evaluating at least one outcome: pain, functional status, perceived recovery, lost days of work. Because of clinical heterogeneity and missing data, results could not be pooled. One high-quality study [30] compared early surgery with prolonged conservative care in 283 patients. Early surgery yielded a faster pain relief but no difference at long term (1–2 years); 39% of the patients assigned to usual conservative care underwent surgery after an average of 19 months. One study [7] compared surgery with epidural steroid injections. This is the only study describing the protocol of the conservative care: 3 epidural injections at 1-week interval. Discectomy was followed by

a more rapid decrease of symptoms but epidural injections were effective in nearly half of the patients who could avoid surgery. Three RCTs [28, 39, 40] compared surgery with usual conservative care. They are summarized in the paper, showing inconsistent results leading to the conclusion that there is conflicting evidence as to whether surgery is more beneficial than conservative care at short and long term. However, the authors allude to an observational cohort study [41] including 743 patients receiving their preferred treatment. In this study, surgery showed significantly better results. Three narrative reviews are also described in the discussion. The strength and limitations of the review are carefully considered. The authors recommend that future studies should evaluate who benefits more from surgery and who from conservative care. To achieve their goal, many parameters, including those coming from imaging, need to be assembled.

Clinical experience indicates that patients undergoing decompressive surgery for a disc herniation have poorer results when LBP is pre-operatively predominant over leg pain. This impression is strengthened and quantified by the excellent paper by Kleinstueck et al. [22] in the July issue. Using the SSE Spine Tango system, the authors collected data from 308 patients who had a decompression procedure for LDH (1 level, no previous spinal surgery). Pre-operatively and 12 months after surgery, the multidimensional core outcome measures index evaluated leg pain: 0–10, and LBP: 0–10. At 12 months, using a Likert scale, patients were divided into two groups: poor or good outcomes. Results are interesting and are in agreement with the clinical experience. Good outcomes were significantly observed in patients with a predominant leg/buttock pain whereas the patients with predominant low-back pain reported fewer good results. In the multivariate analyses, baseline LBP intensity was a strong predictor of the global outcome. This quantified evaluation is useful for appropriate information of the patient pre-operatively.

Anti-TNF therapy for sciatica

It is now admitted that interrelated mechanical and bio-mechanical factors are involved in the genesis of nerve-root pain. In the case of discal herniation, cells from the degenerated disc fragments produce numerous inflammatory mediators, including among others tumor necrosis factor (TNF). For this reason, efficacy of anti-TNF therapy in sciatica has been investigated, but results are not yet clarified. The paper by Watanabe et al. [38] investigates the effect of etanercept, a soluble TNF receptor protein, which neutralizes TNF, in an experimental model of compression of the dorsal root ganglion (DRG) in the rat. Seventy-two adult rats were used and divided into 3

groups: sham, compression by a steel rod with application of etanercept on the DRG at the end of the surgical procedure, and in the third group the same compression on the DRG was carried out with application of saline at the end of the surgery. Behavioral testing examined thresholds of withdrawal after mechanical and thermal testing. The number of immunoreactive cells (macrophages) was calculated by immunohistochemical methods. The results are interesting. Etanercept attenuated the pain-related behavior induced by DRG compression and inhibited increase in the number of macrophages in compressed DRG. The authors rightly point out that anti-TNF therapy could be an option in sciatica induced by spinal canal stenosis.

Epidural steroid injections

It is now admitted that epidural steroid injections have a short-term beneficial effect in the management of low-back pain with radiculopathy, in keeping with the clinical experience. The caudal route is one of the three approaches to the epidural space. A sufficient amount of fluid is necessary to target the level of pathology but it is still questioned whether the injectate administered by the caudal route can reach the higher levels of the lumbar spine. The objective of the study by Cleary et al. [9] in the May issue was to examine the spreading pattern of caudal epidural. A total of 52 patients with LBP with radiculopathy underwent a caudal epidural using 20 ml of a mixture of steroid, contrast, and lidocaine. The injection was done with the patient in the prone position. In order to identify potential strategies to improve the spreading, the cohort was randomized to either the normal prone position or to 30° of Trendelenburg tilt, each group being randomized to the presence or the absence of lordosis obtained by a flexion device placed beneath the prone patient. Results of the study are as follows: the medial segmental level reached was L3 (range T9 to L5). Eradication of lordosis did not change the cephalic spread. There was a trend for the 30° Trendelenburg tilt to extend the injectate upward. The authors conclude that for pathology at levels above L3, a 30° head tilt may improve the cephalic spread, but this is variable. The caudal route is best reserved for pathology below L3. I strongly advise that practitioners of epidural injections read this paper, which contains a good discussion and appropriate references of the choice of techniques to reach the epidural space.

The paper by Teske et al. in the April issue [35] deals with the different injection techniques used to reach the epidural space and target the inflamed nerve roots. The amount of fluid injected varies according to the routes of administration. In the common interlaminar approach,

using the loss of resistance technique, ~10 ml are necessary to correctly fill the epidural space and reach the nerve roots. Larger volumes of fluid, up to 20 ml, are used in the caudal approach. In these two techniques, the dose of local steroid required to be efficient is high, as the diluted injectate spreads over a large surface of the epidural space. Krämer et al. [23] have previously described an epidural-peridural interlaminar approach allowing an injection in the anterolateral space containing the L5 and S1 roots. The interest of this technique relates to the fact that the anterolateral space between the L5 root and the passage of S1 has a more restricted volume and the nerve roots can be targeted directly. The necessary volume of fluid is therefore smaller as well as the required dose of steroid. However, the needed volume of fluid has never been precisely determined. In the paper by Teske et al., the anterolateral volume is scientifically measured in human cadavers and during operations. The mean value for the anterolateral epidural space is 1.1 ml. These anatomical studies confirm that small amounts of fluid and of steroid are required in this technique, which, according to the authors, could be performed without X-ray guidance by trained physicians. L4 and higher nerve roots are not adapted to this technique and must be targeted using the transforaminal approach.

Facet joint denervation

Efficacy of radiofrequency facet joint denervation (RF) is still a matter of debate. Placebo-controlled trials found contradictory results and a few systematic reviews considered insufficient evidence in order to evaluate the procedure reliably. However, other studies have shown that RF can be effective, at least at short term, if stringent criteria are used, including a positive controlled block test and meticulous technique. The prospective, observational study by Streitberger et al. [34] in the December issue is interesting as it aims to evaluate the influence of selected psychosocial and constitutional factors on the outcome of RF denervation of facet joints. The authors have tested 275 low-back pain patients (without radicular pain) with diagnostic lumbar facet-nerve blocks. Controlled blocks were positive in only 47 patients (17.1%) who subsequently underwent facet denervation. Success rates decreased from 33 patients out of 41 at 3 weeks, to 13 at 6 months, and to 9 at 1 year. The median success rate duration was 17 weeks. The interesting point of this well-conducted observational study is that in the bivariate analysis of factors possibly influencing the outcome, only depression evaluated on the Beck Depression Inventory was significant. The main limitation of this study is the small number of patients.

Lumbar spinal stenosis

The paper by Slätis et al. [32] in the July issue is a randomized trial comparing at long term (6 years), the efficacy of surgery versus conservative treatment in a group of patients with long-standing moderate stenosis. This group of patients merits particular attention with regard to its relative frequency in clinical practice. All the patients included in this study had back and leg pain with impaired functional ability related to a narrowing of the lumbar spinal canal at one or several levels. In this series, the patients' condition was evaluated as moderate since the intensity of the functional symptoms obviously did not require an immediate surgical treatment, but an appropriate conservative therapy instead. Epidural steroid injections were not part of the conservative treatment. The authors clearly distinguish this group from the more severe stenosis patients with excruciating pain and neurological dysfunction, as well as from those with mild classical signs and symptoms. The surgical group ($n = 50$) and the conservative one ($n = 40$) with identical baseline parameters were followed for 6 years with an excellent patient attendance and adherence to treatment. Surgical and conservative treatments are well documented. Outcome measures comprise ODI, assessments of leg and back pain, and walking ability. Results are as follows: at 2 years, surgical treatment was clearly superior in all the parameters and four patients of the conservative groups underwent surgery within these 2 years. Efficacy of surgery slowly diminished in the ensuing years. Only the ODI scores were still superior in the surgical group, but back and leg pain did not differ between the two groups. This paper provides useful information on the natural evolution of lumbar stenosis. Unfortunately, the number of patients is too small to identify predictive parameters.

The paper by Moojen et al. [27] published in the October issue is an important one. It is the first systematic review evaluating effectiveness of interspinous process distraction devices (IPD) in patients with intermittent neurogenic claudication due to lumbar spinal stenosis. The review was performed using the Cochrane systematic review methodology. The study selection was stringent as only 3 RCTs and 8 prospective studies were included for methodological assessment and data synthesis. In total, 563 patients included in the review were treated with the implants. Improvement in validated outcome measures was observed in all the studies. IPD treatment was more effective than conservative therapy but there was no argument concerning effectiveness of IPD versus decompression surgery. There is little overall evidence. The authors found only one comparative study with a good methodology; they state that very little is known about treatment in spite of an increasing use of the procedure worldwide. The complication rate is

~7%, consisting principally of reoperations after device failures. The principal message of this paper is the need for high-quality cost-effectiveness studies before worldwide implementation.

I would like to draw attention to the paper by Patel et al. [29] published in the December issue. This article is important in clinical practice as it points out the possible association in one patient of spinal stenosis on imaging with a peripheral neuropathy. Symptoms of peripheral neuropathy can mimic those of spinal stenosis. Indeed, sensory symptoms such as numbness, tingling, difficulty in walking or other neurological abnormalities can be observed in both conditions. The numerous causes of peripheral neuropathy are listed in the article. The authors have chosen to study a dual pathology resulting from the association of spinal stenosis on imaging with vitamin B12 deficiency, a well-known cause of peripheral neuropathy. In a retrospective cohort study, the authors have evaluated vitamin B12 levels in a population of 457 patients presenting to an outpatient clinic specialized in spinal pathology. Vitamin B12 deficiency was disclosed in 37 patients (8.5%). Of these, 27 underwent CT or MRI (2 cervical, 25 lumbar), which disclosed a majority of patients with documented spinal stenosis. Results of a follow-up phone survey showed that 25 of the 37 patients with vitamin B12 supplementation had better or much better outcomes compared to the 12 patients who had no supplementation. These findings strongly suggest that vitamin B12 deficiency was the cause of the symptoms, owing to a peripheral neuropathy. The authors conclude that “causes of peripheral neuropathy should be considered and treated accordingly before embarking on spinal surgical procedures”. This calls for a meticulous clinical examination in patients with spinal stenosis and, especially in doubtful cases, appropriate biochemical investigations and electrophysiological studies.

Treatment of chronic non-specific low-back pain

High-quality systematic reviews and meta-analyses of randomized trials are the best sources of evidence. By synthesizing a large and increasing number of studies, they provide the most concise summaries of research evidence. Two high-quality systematic reviews dealing with the treatment of non-specific low-back pain can be found in the January issue of the Journal. The paper by van Middelkoop et al. [36] systematically evaluates the effectiveness of physical and rehabilitation interventions for chronic LBP. A complete range of therapeutic strategies commonly used in the management of LBP is scrutinized (i.e. exercise, back school, TENS, education, physiotherapy, lumbar supports, multidisciplinary and behavioral treatment). In

total, 83 randomized controlled trials are included in the review. They all concern adult patients with chronic LBP. The GRADE approach is used to determine the quality of evidence based on relevant outcome measures. Overall, the authors conclude that the level of evidence of efficacy is low. Because of lack of data, no firm conclusions can be formulated regarding specific therapies such as back school, education, traction, massage, and lumbar supports. Implications for research are provided. At the present time, the authors conclude that only exercise therapy, and multidisciplinary and behavioral treatment can be recommended. Unfortunately, centers providing these therapeutic strategies are still scarce.

The paper in the January issue by Kuijpers et al. [24] systematically evaluates the effectiveness of pharmacological interventions for chronic non-specific low-back pain. Selected randomized trials have been extracted from already existing Cochrane reviews and from an update of the literature. Methods of the review concerning study selection, assessment of risk of bias, data extraction and analysis of quality of evidence are those of the Cochrane Back Review Groups. A total of 17 randomized controlled trials are included: NSAIDs ($n = 4$), anti-depressants ($n = 5$) and opioids ($n = 8$). No controlled trial was found for relaxants. The authors conclude that the level of evidence is low. No significant difference of efficacy was found between anti-depressants and placebo. NSAIDs and opioids are only effective for short-term relief, with possible side effects.

Physical activity and low-back pain

Three systematic reviews can be found in the 2011 issues of ESJ. The paper by Hendrick et al. [15] published in March is a high-quality systematic review of observational studies evaluating the relationship between free-living activity levels in patients with low-back pain and low-back pain outcomes. Stringent criteria of inclusion are used: free-living measurement is defined as a measure of activity undertaken in day-to-day life, including occupational, sports, and leisure activities. Studies evaluating simple exercise therapy or those that only measured activity limitations or pain with activity were excluded. Only 12 studies (7 cohort and 5 cross-sectional) could be included. One prospective study reports a significant association of increased leisure-time activity with improved LBP outcomes, whereas one cross-sectional study concludes that lower sporting activity is associated with higher levels of pain and disability. All other studies found no relationship between pain and disability and activity levels. Based on these results and in spite of the limited numbers of studies, the authors, considering the health benefits of activity,

recommend that patients with LBP maintain, restore and increase their physical activity.

The paper by Sitthipornvorakul et al. [31] in the May issue is another high-quality systematic review dealing with the association between physical activity and low back and neck pain. Seventeen studies, of which 13 were of high quality, targeted school children as well as the general population. The types of physical activity were essentially routine-daily and leisure-time. Data of the literature were heterogeneous. The authors concluded that there was conflicting evidence for the association between physical activity and low-back pain in the general population and in school children. Regarding neck pain, the selected studies principally concerned school children and no association was found. Only one study concerned the working population, generating a limited evidence for no association.

The paper by Heneweer et al. [16] published in June is a high-quality systematic review exploring the evidence of the association between LBP and physical activity, including occupational load and non-occupational physical activities. Thirty-six cohorts or case-control studies were selected. Risk factors of LBP were heavy workload, accumulation of loads, frequency of lifts, and awkward posture of the lumbar spine. Studies focusing on habitual daily activities such as domestic or commuting are lacking. Inconsistent results were disclosed for leisure-time physical activities.

Some conclusions can be drawn from these three papers. Firstly, heavy workload, awkward postures and frequent lifting are risk factors for LBP. Secondly, there is conflicting evidence for the association of free living, leisure-time, domestic and low-physical activity with low-back pain in the general population and in school children. More research work is needed to reach a definite conclusion regarding this type of light physical activity.

Conflict of interest None.

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