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Letter to Editor

"Only fixation:" Simple act, but mammoth stride toward great aspiration in managing cervical spondylotic myelopathy

Sir,

It is always a pleasure to go through the articles of your esteemed journal. Recently, I found an astounding article in your journal on a new vision of surgical management of cervical spondylosis (CS) by Professor Atul Goel entitled "Only fixation for CS: Report of early results with a preliminary experience with 6 cases."[1] Professor Goel is a world leader in the field of neurosurgery, especially having an immense contribution on the management of most difficult pathologies around the craniovertebral junction. He has innovated and popularized many techniques for the treatment of these difficult conditions. His simple and easy, time tested revolutionary techniques have enriched neurosurgery in so many ways. In this very enlightening article, he has given a new philosophy on management of cervical spondylotic myelopathy (CSM) based on a unique concept of pathological origin.

CSM is a leading cause of spinal cord dysfunction with highly variable presenting symptoms and signs in the adult population. Affected patients represent a large subset of individuals who needs to undergo operative treatment.

In this nice article, Professor Goel has given a new thought for the operative management of CSM. His philosophy of treatment is based on the theory that "vertical spinal instability" results in telescoping of the facets and forms the basis of pathogenesis of cervical degenerative spondylosis.[1] The conventional theory of CSM describes aging process, wear and tear, excessive motion, and repetitive microtrauma as the common etiologies.[2,3] Multiple static and dynamic mechanical factors, as well as ischemic factors following posterior bulge of the degenerated disc, leads to a series of events resulting in reduction of intervertebral disc height, and narrowing of spinal canal and neural foramen.[2-16] It is logical that spinal canal stenosis following disc herniation and reduction of disc height may initiate facet joint instability to progress to further changes of the disease. However, Professor Goel in his hypothesis regarding pathogenesis of spondylosis in this article illustrated that the involvement of discs is not the primary pathology in degenerative process rather that is only secondary to instability and telescoping of the facets, as a result of the neck muscle weakness. Such instability is often observed on direct visualization of the joint during surgery, which is not always recognized straight away in preoperative dynamic radiographs. The degenerative processes such as degeneration of disc, reduction of the disc space height, osteophyte formation, hypertrophy, and buckling of the posterior longitudinal ligament (PLL) and ligamentum flavum (LF) into the spinal canal are all secondary consequences of primary vertical instability. Professor Goel strongly advocates that essentially the ligaments are buckled and not hypertrophied or degenerated, and he has emphasized on this theory in some of his earlier articles also.[1,13,15-19]

In the course of progression of CSM, among other pathological processes, the osteophyte formation results from periosteal reaction following buckling and stripping off of the PLL.[1,16,17,19] It seems very unlikely that, only buckling of the PLL from the posterior aspect of the vertebral body would strip off the PLL. Rather it is more reasonable that the push by the degenerated and prolapsed disc would strip off the PLL and thus initiate the periosteal reaction to start the osteophyte formation. Instability alone cannot strip off the PLL as the range of movement at the facet joints are not appreciable enough to cause the stripping off. Rather because of the instability, the stripping off might increase as there is more space to move after a decrease in disc space following disc degeneration and prolapse. For instability and telescoping of the facets, there must be some space to accommodate the range of movement of the facets, which is obtained by the reduction of the height and posterior bulge by the degenerated disc. In case of the LF, buckling inside the spinal canal is surely one of the reasons of canal stenosis, but there is surely hypertrophy also as seen during surgery and this fact has been supported by many authors.[20-25] Instability, following the disc prolapse and detachment of the PLL, may add to the formation of the osteophytes as this might be a part of the attempt of natural protection to stabilize the abnormal spine motions. Moreover, as Professor Goel has shown resolution of osteophytes after arthrodesis, it is likely that the natural attempt to prevent abnormal motions is no more required, and arthrodesis by this means may help in regression of the osteophytes.

As Professor Goel hypothesized, if retrolisthesis is the instigator of the spondylotic changes, that causes radiculopathy by

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reducing the intervertebral canal height, then most of the patients of CS would have more radiculopathy rather than having myelopathy, which is not the usual finding. Hence, it seems that only retrolisthesis does not play a role in the development of CSM, but surely it is one of the main factors.

Though we differ a little regarding the pathogenesis of CSM, Professor Goel has very aptly pointed out that the issue of instability in degenerative CS has been discussed, but its role as the primary factor in the pathogenesis has not been explored appropriately or utilized properly for managing this condition before. With his new technique, he attempted to realign the spinal elements by distraction and fixation. Essentially his aim of surgery is fixation and arthrodesis where no bone, ligament or disc resection is necessary.[1] Professor Goel has evolved his philosophy of management of CSM on the part of instability of facet joints in the pathogenesis of CSM and has tried to utilize that successfully, at least as the initial results show. Most of the surgical techniques for CSM targets primarily toward neural decompression alone or decompression along with stabilization. Here he has tried to stabilize as well as to decompress with a single maneuver. The aim is arthrodesis for stabilization and decompression comes as by product. However, to us it seems inadequate tactic for decompression, as the compressive elements are not addressed directly. Because of the lengthening of the vertical height by distraction and fixation, the spinal canal truly gets some space, but that does not seem to be enough to well decompress the neural elements. The prolapsed disc, osteophytes, hypertrophied PLL, or ossified PLL are not removed by this technique, which continues to be compressing elements. From posterior, there might be debuckling of the LF to make space, but the hypertrophy of the ligament and the facet joints encroaching into the spinal canal cannot be addressed, which is feasible by laminectomy, laminectomy with fixation or laminoplasty. Though he has shown that there is a reversal of pathological processes, it is not well documented by measurements. If this can be proved well that by this technique of "only fixation," the pathologies can be reverted to normal, this technique is going to be a revolution in this field as this gives the maximum benefit with minimum destruction of natural structures.

Two transarticular screws, which the author calls "double insurance," may give better and stronger arthrodesis, but at the same time there is risk of fracture of the articular process, if the screws are not selected properly in diameter or placed in the right trajectory, which may happen in the hands of an inexperienced surgeon and might prove disastrous. In such circumstances we feel that, a single but little wider screw than is usually used, would give stronger stabilization with more safety but same efficacy, especially in the cervical spine, where the facet joints are smaller than those in other regions of the spine. By the fixation of the joints, movement at the corresponding levels is restricted. Consequently, the chance of hypermobility at the adjacent levels above or below the fixation still remains, resulting in initiation of or progression of spondylotic changes at these levels, which is a continuing problem with all procedures with fixation.

Though the outcome described by the authors is very promising, it is a very short follow-up period, merely 3-8 months, averaging just 6 months. It is a too short time of follow-up to comment on the result of a procedure where the rates of late complications or changes, related to the disease process or surgery are high.

Professor Goel has researched on this problem with his vast experience and gradually developed this technique. He has attempted with facet distraction and spacers[14] followed by facet distraction, spacers, and lateral mass plate screw fixation,[17] fixation with intraarticular screws with distracting the facets[15] and now this new process of intraarticular fixation only.[1] Hence, he is having the evolution of the surgical procedure, at the same time he is revolutionizing the techniques as well. The technique he described in this article is the latest advance that makes space in the stenosed spinal canal and neural foramen by facet distraction leading to ligament unbuckling to some extent and decompression of others, thus decompressing the spinal cord and nerve roots. This procedure, at the same time, takes a step for stable and ensured arthrodesis, especially when he is addressing the fulcrum of the movement. Hence, this is a unique procedure as it results in instant stable arthrodesis, as well as decompression of cord, with a single action which is better than other anterior or posterior fixation procedures, as there is lesser chance of movement as compared to fixing with plates and screws. As there is no use of graft, and there is no chance of graft dislodgement or subsidence as seen in anterior cervical discectomy and fusion and anterior cervical corpectomy with fusion. In cases of laminectomy only, late deterioration is observed mostly because of the postoperative instability. With his procedure, Professor Goel has addressed all these technical hitches very well with a single maneuver. He has succeeded in a reversal of the pathologic changes as well, which has not been shown in any other studies yet.

This extraordinary procedure also requires less time and effort in expert hands, as well as has the maximum chance of improvement, of the patients with maximum preservation of the natural components of the spine, compared to the other well-practised procedures for CSM. Moreover, most importantly it is a unique procedure, which gives the maximum cost benefit ratio, especially for the patients of developing countries where most of the patients are not that well-off and the insurance coverage is poor.

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Conflicts of interest
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REFERENCES

1. Goel A. Only fixation for cervical spondylosis: Report of early results with a preliminary experience with 6 cases. J Craniovertebr Junction Spine 2013;4:64-8.
2. Lee BS, Ghogawala Z, Benzel EC. Cervical Spondylotic Myelopathy and Sagittal Deformity. WScJ 2014;5:119-23.
3. Yarbrough CK, Murphy RK, Ray WZ, Stewart TJ. The natural history and clinical presentation of cervical spondylotic myelopathy. Adv Orthop 2012;2012:480643.
4. Barnes MP, Saunders M. The effect of cervical mobility on the natural history of cervical spondylotic myelopathy. J Neurol Neurosurg Psychiatry 1984;47:17-20.
5. Mattei TA, Goulart CR, Milano JB, Dutra LP, Fasset DR. Cervical spondylotic myelopathy: Pathophysiology, diagnosis, and surgical techniques. ISRN Neurol 2011;2011:463729.
6. Murone I. The importance of the sagittal diameters of the cervical spinal canal in relation to spondylosis and myelopathy. J Bone Joint Surg Br 1974;56:30-6.
7. Bernhardt M, Hynes RA, Blume HW, White AA 3rd. Cervical spondylotic myelopathy. J Bone Joint Surg Am 1993;75:119-28.
8. McDonnell M, Lucas P. Cervical spondylosis, stenosis, and rheumatoid arthritis. Med Health R I 2012;95:105-9.
9. Takagi I, Eliyas JK, Stadlan N. Cervical spondylosis: An update on pathophysiology, clinical manifestation, and management strategies. Dis Mon 2011;57:583-91.
10. Emery SE. Cervical spondylotic myelopathy: Diagnosis and treatment. J Am Acad Orthop Surg 2001;9:376-88.
11. Rao RD, Gourab K, David KS. Operative treatment of cervical spondylotic myelopathy. J Bone Joint Surg Am 2006;88:1619-40.
12. Matz PG, Anderson PA, Holly LT, Groff MW, Heary RF, Kaiser MG, *et al.* The natural history of cervical spondylotic myelopathy. J Neurosurg Spine 2009;11:104-11.
13. Goel A, Shah A. Facetal distraction as treatment for single- and multi-level cervical spondylotic radiculopathy and myelopathy: A preliminary report: Technical note. J Neurosurg Spine 2011;14:689-96.
14. Goel A. Alternative technique of cervical spinal stabilization employing lateral mass plate and screw and intra-articular spacer fixation. J Craniovertebr Junction Spine 2013;4:56-8.
15. Goel A. Only fixation as rationale treatment for spinal canal stenosis. J Craniovertebr Junction Spine 2011;2:55-6.
16. Goel A. Relevance of Goel's hypothesis regarding pathogenesis of degenerative spondylosis and its implications on facet distraction surgery. J Craniovertebr Junction Spine 2012;3:39-41.
17. Goel A. Facet distraction spacers for treatment of degenerative disease of the spine: Rationale and an alternative hypothesis of spinal degeneration. J Craniovertebr Junction Spine 2010;1:65-6.
18. Goel A. Facet distraction-arthrodesis technique: Can it revolutionize spinal stabilization methods? J Craniovertebr Junction Spine 2011;2:1-2.
19. Goel A. Is it necessary to resect osteophytes in degenerative spondylotic myelopathy? J Craniovertebr Junction Spine 2013;4:1-2.
20. Park JB, Lee JK, Park SJ, Riew KD. Hypertrophy of ligamentum flavum in lumbar spinal stenosis associated with increased proteinase inhibitor concentration. J Bone Joint Surg Am 2005;87:2750-7.
21. Chen J, Liu Z, Zhong G, Qian L, Li Z, Qiao Z, *et al.* Hypertrophy of ligamentum flavum in lumbar spine stenosis is associated with increased miR-155 level. Dis Markers 2014;2014:786543.
22. Sairyo K, Biyani A, Goel VK, Leaman DW, Booth R Jr, Thomas J, *et al.* Lumbar ligamentum flavum hypertrophy is due to accumulation of inflammation-related scar tissue. Spine (Phila Pa 1976) 2007;32:E340-7.
23. Sairyo K, Biyani A, Goel V, Leaman D, Booth R Jr, Thomas J, *et al.* Pathomechanism of ligamentum flavum hypertrophy: A multidisciplinary investigation based on clinical, biomechanical, histologic, and biologic assessments. Spine (Phila Pa 1976) 2005;30:2649-56.
24. Kosaka H, Sairyo K, Biyani A, Leaman D, Yeasting R, Higashino K, *et al.* Pathomechanism of loss of elasticity and hypertrophy of lumbar ligamentum flavum in elderly patients with lumbar spinal canal stenosis. Spine (Phila Pa 1976) 2007;32:2805-11.
25. Shafaq N, Suzuki A, Terai H, Nakamura H, Takaoka K, editors. Histopathological Analysis of Hypertrophic Ligamentum Flavum in Degenerative Lumbar Canal Stenosis Focus on the Expression of Bmps Signaling Components: 58. Spine Journal Meeting Abstracts, LWW; 2010.

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