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Correspondence

We welcome letters to the Editor concerning articles which have recently been published. Such letters will be subject to the usual stages of selection and editing; where appropriate the authors of the original article will be offered the opportunity to reply.

Letters should normally be under 300 words in length, double-spaced throughout, signed by all authors and fully referenced. The edited version will be returned for approval before publication.

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Simultaneous anterior decompression and posterior instrumentation of the tuberculous spine using an anterolateral extrapleural approach

Sir,

We read with interest the article by Jain et al[1] in the November 2008 issue entitled 'Simultaneous anterior decompression and posterior instrumentation of the tuberculous spine using an anterolateral extrapleural approach, and would like to make the following comments.

1. If neurologically intact patients are permitted to sit and walk in a brace six to eight weeks following surgery, I wonder if the purpose of spinal stabilisation is defeated. Our earlier study[2] shows clearly that patients stabilised in the manner described can be made to sit, stand and ambulate well within a week following surgery, thereby obviating the complications of recumbency irrespective of the patients' neurological status. This also permitted early discharge from hospital.

2. The authors state that "If posterior stabilisation is undertaken without previous anterior decompression the kyphosis cannot be corrected. If anterior decompression and fusion are performed first without instrumentation, the spine is rendered grossly unstable increasing the risk of further neurological injury until second-stage instrumentation is undertaken". Most spinal surgeons with experience would contest this statement.

First-stage posterior surgery advocates point to significant correction of kyphosis in patients with active disease.[3] The proponents of first-stage anterior surgery would say that anterior debridement and grafting in the presence of radiologically intact posterior elements would offer sufficient stability to permit the patient to be positioned prone for posterior instrumentation.[4]

3. Our earlier publication[2] showed no increased morbidity in patients undergoing both anterior and posterior surgery the same day under one anaesthetic.

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1. **Jain AK, Dhammi IK, Prashad B, Sinha S, Mishra P.** Simultaneous anterior decompression and posterior instrumentation of the tuberculous spine using an anterolateral extrapleural approach. *J Bone Joint Surg [Br]* 2008;90-B:1477-81.
2. **Sundararaj GD, Behera S, Ravi V, et al.** Role of posterior stabilisation in the management of tuberculous of the dorsal and lumbar spine. *J Bone Joint Surg [Br]* 2003;85-B:100-6.
3. **Moon MS, Woo YK, Lee KS, et al.** Posterior instrumentation and anterior interbody fusion for tuberculosis kyphosis of dorsal and lumbar spines. *Spine* 1995;20:1910-16.
4. **Chen WJ, Wu CC, Jung CH, et al.** Combined anterior and posterior surgeries in the treatment of spinal tuberculous spondylitis. *Clin Orthop* 2002;398:50-9.

Author's reply:

Sir,

The authors would like to thank Dr Sundararaj for his interest in our study. He has raised several points which deserve further comment. We have the following explanations to offer.

1. The time to mobilisation after surgery depends on the stability of the spine and the spinal construct. The cases in our series[1] (T1 to L2) were more severely affected than similar cases in study by Sundararaj et al.[2] In the present series the mean number of vertebral body involvement was 3.24 (2 to 9), mean initial vertebral body loss was 1.2 (0.4 to 3.1), and mean pre-operative kyphus was 49° (30° to 72°). On comparing cases involving the dorsal and dorsolumbar region (n = 49) in their study,[2] these values were found to be 2.1 (1 to 4), 0.9 (0.23 to 1.14) and 27.5° (10° to 60°) respectively. We were able to achieve better kyphus correction at the final mean follow-up of 32.9 months (pre-operative 49°, immediate post-operative 22.5°, final follow-up 24°, mean final correction obtained 25°) which includes eight cases of panvertebral disease having lesser vertebral body involvement, less initial vertebral body loss and minimal kyphosis which necessitated only surgical stabilisation and not correction of kyphosis.[1] Sudararaj et al[2] have reported in their similar cases involving dorsal and dorsolumbar kyphosis correction as follows: pre-operative 27.5°, immediate post-operative 15.7°, final follow-up 20°, mean final correction obtained 7.5°. There was graft subsidence in three cases, collapse in one and fracture in one. These five cases had an increase in their kyphus angle. They also observed one case of wire loosening and two of sublaminar wire breakage.[2] However, we did not encounter any graft-related or implant failures except for subcutaneous prominence in one child which necessitated removal of the implant without loss of final kyphus correction at 18 months. Luque-Hartshill segmental instrumentation with sublaminar wires is not a load-bearing construct. It provides semi-rigid fixation and is inadequate to resist axial loads.[3] As biomechanical testing suggests, the weak point in this system is a failure to counteract axial loading.[4] We therefore allowed a four- to six-week period of immobilisation in order to attain some early structural strength at the vertebral host-graft junction and to withstand forces while loading the spine during mobilisation, especially at the thoracolumbar junction. We believe that better maintenance of the final kyphus correction in the absence of any graft or implant-related complications in our series can at least in part be attributed to this brief and

cautious period of immobilisation even in neurologically intact patients (n = 11). Mobilisation of patients with neural deficit is dictated by their sequential post-operative neurological status.[1]

2. In a patient with tuberculosis of the spine and active disease, a neurological deficit is caused by retropulsed granulation tissue, sequestrated disc and bony sequestra. In severe initial kyphosis, the final angular deformity is higher. From a biomechanical viewpoint, kyphotic deformity markedly increases the torque of compression and further speeds the collapse of the vertebral body,[5] thereby forcing the diseased tissue further into the spinal canal. In the severe kyphosis of active disease, posterior only correction without prior anterior debridement of diseased tissue and decompression, is not recommended as it may achieve a suboptimal correction of kyphosis, at the same time leaving the retropulsed tissue in the spinal canal causing increased mechanical pressure on the spinal cord with ensuing worsening of the neurological deficit. Moon[6] advocates posterior instrumentation as first stage procedure to correct and/or to prevent progressive kyphosis, provided the kyphosis is not fixed and severe. Chen et al[7] suggest that since the disease is located anteriorly, for patients with severe vertebral body destruction, neurological deficit, and severe kyphotic deformity, posterior surgery with chemotherapy cannot achieve adequate neurological decompression, anterior stability and correction of kyphosis. In our cases, the average kyphosis was severe (49°) and 27 of 31 patients had a neurological deficit. Hence it was our standard approach to start with the diseased tissues anterior to the cord to achieve spinal decompression, debridement and anterior release which in combination with simultaneous limited posterior vertebral element resection (posterior column shortening) achieved greater effective correction of kyphosis with minimal risk of increasing anterior mechanical pressure on the spinal cord which is under direct vision throughout surgery. We are therefore able to accomplish anterior decompression, fusion (using a compression fit with tricortical iliac crest/quadrupled rib grafts), kyphosis correction after anterior release and posterior column shortening/resection if necessary, and posterior instrumentation through a single approach with minimal morbidity and little risk of graft-related complications. Graft slippage and breakage occur more when the graft spans more than two vertebral bodies and is not supported by instrumentation, thus ending in progression of the kyphosis.[8] Also, it has been reported that kyphosis increased after radical debridement and anterior grafting when the bone graft was inadequate or when it fractured, slipped or was resorbed.[9] Thus the authors believe that anterior decompression and fusion without instrumentation does indeed carry a risk of graft-related complications, which if they occur may increase further the neurological insult to the spinal cord. Mindful of the previously highlighted reports, the authors at the same time also acknowledge the results of other workers like Moon et al[10] and Chen et al[7] who have been able to achieve good results after one or two staged anterior and posterior procedures without significant graft-related or iatrogenic neurological complications.

3. The main objective of our paper was to highlight the advantages offered by the anterolateral extrapleural method by which one can approach the vertebral body and the posterior complex simultaneously to decompress and stabilise the spine and even shorten the posterior column if needed during kyphus correction. The chest cavity, abdominal cavity and the diaphragm are not violated, hence the post-operative morbidity is lower than that of the transthoracic and transdiaphragmatic approaches, and thus can even be carried out in centres with suboptimal intensive care facilities. As was evident, none of our patients developed post-operatively pulmonary complications or required intensive care. We acknowledge the good results obtained by other authors who perform staged anterior decompression and fusion using the transpleural-transdiaphragmatic approach followed or preceded by posterior instrumentation and fusion with acceptable morbidity.

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1. **Jain AK, Dhammi IK, Prashad B, Sinha S, Mishra P.** Simultaneous anterior decompression and posterior instrumentation of the tuberculous spine using an anterolateral extrapleural approach. *J Bone Joint Surg [Br]* 2008;90-B:1477-81.
2. **Sundararaj GD, Behera S, Ravi V, et al.** Role of posterior stabilisation in the management of tuberculosis of the dorsal and lumbar spine. *J Bone Joint Surg [Br]* 2003;85-B:100-6.
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