Eur Spine J (2011) 20:6–8
DOI 10.1007/s00586-010-1527-2

GRAND ROUNDS

Expert's comment concerning Grand Rounds case entitled "Posterior listhesis of a lumbar vertebra in spinal tuberculosis" (by Matthew A. Kirkman and Krishnamurthy Sridhar)

Philip Sell

Received: 13 July 2010 / Published online: 11 August 2010
© Springer-Verlag 2010

It is a privilege to be asked to provide an expert opinion on an interesting case such as this. My personal experience of spinal tuberculosis is modest compared to the extensive skills of my colleagues in Asia and on the Pacific Rim.

My city of Leicester, in middle England, is multicultural with over 50% of the population being non-Caucasian. My own database records 115 procedures for spinal tuberculosis over the last 15 years. Putting these cases in perspective I operate on about one in three of the cases that I see, as so often the management is medical.

Tuberculosis is a great mimic, and is on the increase, or perhaps the reality is it is more easily diagnosed and more commonly notified. In 1997, new cases of TB totalled an estimated 7.96 million (range, 6.3 million–11.1 million), including 3.52 million (2.8 million–4.9 million) cases (44%) of infectious pulmonary disease (smear-positive). An estimated 1.87 million (1.4 million–2.8 million) people died of TB and the global case fatality rate was 23% but exceeded 50% in some African countries with high HIV rates [2]. Tomsk prison in Russia may have the highest prevalence in the world at present… So, don't get imprisoned in Russia! In our modern mobile world of air travel the combined effects of proximity in the cabin and recirculated partially filtered air are the risk factors.

What are the learning points and what can I add to this grand round?

Well, a few thoughts and suggestions as an invited 'expert'. Please at all times remember that this expert can only ever be level 4 evidence, but I hope that still has some added value. A 'grand round' is not a systematic or narrative review, and it is not a case report. It is a learning opportunity where there may be consensus on some aspects and a variety of points of view on others.

Diagnostic reasoning is a process by which we confirm or exclude diagnosis. The traditional medical model is history, examination, investigation and treatment. The reality is different. What we really do is initiate a diagnostic hypothesis, which is refined through a process of exclusion and confirmation to define the final diagnosis.

In this case, the diagnosis was highly probable from the start. The 'spot diagnosis' is spinal tuberculosis producing progressive neurology. The history of pulmonary tuberculosis and the new onset of neurology are the clinical indicators that give this a high likelihood. The imaging is dramatic, but typical of tuberculosis involvement of the spine. Heuristics would suggest 'If it looks like a duck and quacks like a duck, it probably is a duck'. The probability of this presented case not being TB is low. Multifocal lesions in the spine are becoming more common and add to

P. Sell (✉)
University Hospitals of Leicester, Leicester, UK
e-mail: psell2.spine@tiscali.co.uk

the diagnostic challenge [9]. Doctors do not like medical uncertainty, and surgeons, despite cognitive bias, specifically seek to establish a diagnosis. The reality of day to day surgical practice is that we often have to make rapid important decisions in the face of inadequate data. Most times we get it right, fortunately.

Faced with a rapidly progressive neurological deficit, but with some preservation of sensation, neurological salvage is mandatory. If the magnitude of the required surgery is beyond the scope of the surgeon then transfer to a facility that can deal with it must occur. Decompression of the compressing pathology is the principal. At cord level, generally, anterior compression is dealt with through an anterior approach. The method of stabilisation depends upon the materials available. The early surgical trials in spinal tuberculosis remain the best evidence. Rib graft, iliac crest and other biological materials are of low cost and readily available. After decompression, the issue of reconstruction and stabilisation is the next to address. There is no level one or level two evidence for the use of titanium cages but they are certainly convenient if available and possibly less technically demanding to use.

Indications for surgery in spinal tuberculosis

There are always relative and absolute indications depending upon specific and safe circumstances. Practical wisdom is the clinical judgement used by a skilled clinician in determining the best option for the individual patient. The general guidance for intervention would be

1. progressive neurology,
2. progressive deformity,
3. doubt about the diagnosis,
4. failure to respond to treatment.

The Cochrane review [4] relates mainly to the Medical Research Council trials on spinal tuberculosis and only patients without significant neurology were entered. Hence the recommendation that routine surgery cannot be recommended.

Procedure

Anterior decompression and stabilisation with instrumentation was undertaken in this case. There would be limited consensus regarding the specifics of selected procedure and the fact is that there are many solutions that would give favourable outcomes.

The end plates are parallel and so the risk of deformity in the future is low. However, in a growing child aged 12 there is a need to be monitored to the end of growth. There are two reasons for this. One is the development of a secondary neuromuscular scoliosis due to the neurological status. The other is continued posterior growth with an anterior fusion producing late kyphosis [10–12].

Personal preference

As a generalisation, I tend to do anterior procedures to decompress and salvage the neurological deterioration and then a posterior stabilisation. The posterior stabilisation can occur either at the same time if the patient status allows or as a secondary staged procedure. In this case, I might have taken the 'heat' of the acute situation with an anterior decompression, probably using iliac crest as a tri-cortical strut graft. Historically, biologic graft material was preferred. The current trend is for instrumentation. This is really an issue of surgeon preference and experience. There are now many publications relating to the safe use of instrumentation in reconstruction of non-pyogenic infection [3, 8]. A posterior stabilisation would be prior to mobilising and probably two levels above and two below for security of reconstruction. The surgeon needs to have an awareness of the importance of mobility across the thoracolumbar junction for the long-term rehabilitation and independence, if a significant neurological deficit persists.

Investigations

There are many investigations that can occur. The question is really, what is the most efficient pathway of investigation in terms of diagnostic yield and cost. Once more, the term 'practical wisdom' comes to mind regarding clinical judgement. It is not possible to send too many surgical specimens. Multiple swabs and tissue samples should be sent for culture and histology at the time of surgery.

New developments that may contribute if the diagnosis is in doubt would be the use of interferon-gamma release assays. The QuantiFERON-TB Gold blood test available in some centres that may, if positive, give a more rapid likelihood of the diagnosis. However, in children or the immuno-compromised and previously exposed the same interpretation difficulties as a skin PPD test obtain. There are a number of different interferon-gamma release assays available. The role has been well-defined in pulmonary tuberculosis but is less clear in extra-pulmonary disease [1, 6].

PET/CT may have a role, not so much in the diagnosis but in determining residual infection. Fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography imaging is well established in tumour staging and its role in spinal infection is currently being defined [5, 7].

Multi-disciplinary management

There are significant complications that can occur in the chemotherapeutic management of tuberculosis and I would always have 'shared care' with my expert colleagues in infectious diseases. As a public health issue, certainly in the UK and Europe tuberculosis is a disease that by law is notified. The burden of contact tracing and screening of friends and family is undertaken by the Public Health specialists.

Summary

There are many different ways of achieving the same surgical objective, and where evidence is not available then clinician judgement is based on experience and local resources.

The concept of 'practical wisdom' is that synthesis of experience, wisdom, and evaluation of the evidence base in local context.

The latest advances in imaging and diagnostic methods may not be relevant to a specific case management.

Shared care of the medical management and multidisciplinary rehabilitation after surgery is extremely important to improved outcomes for the patient and society.

References

1. Chang KC, Leung CC (2010) Systematic review of interferon-gamma release assays in tuberculosis: focus on likelihood ratios. Thorax 65(3):271–276
2. Dye C, Scheele S, Dolin P, Pathania V, Raviglione MC, for the WHO Global Surveillance, Monitoring Project (1999) Global burden of tuberculosis: estimated incidence, prevalence, and mortality by country. JAMA 282:677–686
3. Jin D, Qu D, Chen J, Zhang H (2004) One-stage anterior interbody autografting and instrumentation in primary surgical management of thoracolumbar spinal tuberculosis. Eur Spine J 13(2):114–121
4. Jutte PC, Van Loenhout-Rooyackers JH (2006) Routine surgery in addition to chemotherapy for treating spinal tuberculosis. Cochrane Database Syst Rev (1):CD004532
5. Kim SJ, Kim IJ, Suh KT, Kim YK, Lee JS (2009) Prediction of residual disease of spine infection using F-18 FDG PET/CT. Spine 34(22):2424–2430
6. Kumar R, Das RK, Mahapatra AK (2010) Role of interferon gamma release assay in the diagnosis of Pott disease. J Neurosurg Spine 12(5):462–466
7. Lee IS, Lee JS, Kim SJ, Jun S, Suh KT (2009) Fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography imaging in pyogenic and tuberculous spondylitis: preliminary study. J Comput Assist Tomogr 33(4):587–592
8. Moon MS, Woo YK, Lee KS, Ha KY, Kim SS, Sun DH (1995) Posterior instrumentation and anterior interbody fusion for tuberculous kyphosis of dorsal and lumbar spines. Spine (Phila Pa 1976) 20(17):1910–1916
9. Polley P, Dunn R (2009) Noncontiguous spinal tuberculosis: incidence and management. Eur Spine J 18:1096–1101
10. Upadhyay SS, Saji MJ, Sell P, Yau AC (1994) The effect of age on the change in deformity after radical resection and anterior arthrodesis for tuberculosis of the spine. J Bone Joint Surg Am 76(5):701–708
11. Upadhyay SS, Saji MJ, Sell P, Sell B, Hsu LC (1994) Spinal deformity after childhood surgery for tuberculosis of the spine. A comparison of radical surgery and debridement. J Bone Joint Surg Br 76(1):91–98
12. Upadhyay SS, Sell P, Saji MJ, Sell B, Yau AC, Leong JC (1993) 17 year prospective study of surgical management of spinal tuberculosis in children. Hong Kong operation compared with debridement surgery for short- and long-term outcome of deformity. Spine (Phila Pa 1976) 18(12):1704–1711