Expert's comment concerning Grand Rounds case entitled “Management of cervical myelopathy due to ossification of posterior longitudinal ligament in a patient with Alström syndrome” (by Bronek M. Boszczyk, Rishi Mugesh Kanna and Daniela Gradil)

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The authors present an extremely rare case of Alström Syndrome who developed an extensive and serious ossification of spinal ligament [1]. Extensive ossification of both anterior and posterior longitudinal ligaments from C1 to T1 was observed with an occupying ratio more than 50 %, and combined with large osteophytes in front of vertebral bodies and ossification of ligament flavum from T1–3. Combined morbidity included sight and hearing loss, hepatic and renal dysfunction, hypertension, diabetes mellitus and polyarthritis. Progressive numbness in the finger tips was the chief complaint and further examination discovered weak hand grip and sensory loss below C5 dermatome, and positive myelopathic signs related to the spinal cord lesion. Posterior laminectomy from C3–6 without instrumentation was performed by the authors.

Improved hand function and gait were observed after operation. Postoperative MRI demonstrated an excellent decompression of spinal cord.

Severe OPLL is hard to deal with. The communication problem in this case provided extra difficulty to the operation, so did multiple combined morbidities. The authors should be praised for their great efforts in this case. I admired the final decision of a simple yet effective way with laminectomy alone. I would do the same for the patient.

Matsunaga et al. [2] found 71 % patients of OPLL without original myelopathy lived myelopathy-free during a 30-years follow-up, and advocated that preventive surgery was not necessary for non-myelopathic patients. We observed some cases of OPLL without symptoms of myelopathy (or not diagnosed myelopathy) who were rendered quadriplegic and/or presented with dyspnea after minor trauma like slipping from a chair in sitting position or cycling on macadam. To prevent the catastrophic outcome, we have now accumulated more cases and look for risk factors that may indicate precautionary surgical treatment in non-myelopathic patients.

For the surgical strategy of OPLL, controversies continue. Anterior corpectomy has the advantage of thorough decompression with removal of the ossified mass, which promises a better long-term result [3]. The major shortcoming of anterior approach (AA) is that it is not appropriate for very extensive lesion and that the fusion rate drops in that condition. An anterior approach is always considered as technically demanding. Posterior approach (PA) is preferred by some surgeons for safety and ease, but it could not provide adequate decompression of spinal cord in patients with preoperative kyphosis, and the results were not as good as AA, especially in massive ossification and in long follow-up. Mean improvement rate after operation

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was 58–68.4 % in AA and 13–54 % in PA, and fell to 34 and 14 % during follow-up [3–5].

Rationale for treatment and evidence-based literature-debate

Decision for operation

For the patient who used to ambulate in a wheelchair, efforts to improve gait by surgical treatment should be questioned. As the patient had already lost hearing and sight, sense of hand become extremely important for him and the operation had its rationale.

Anterior or posterior

PA was obviously the only choice in this case for the extensive lesion from C1 to T1 and compression of spinal cord from C4 to T1. I may choose removal of lamina of C7 as there was compression at the C7/T1 level. But based on postoperative MRI, C3–6 laminectomy was enough. For some case with limited extension of the ossified mass, selective laminectomy or laminoplasty also works. There are also some opinions that preserving C7 spinal process could prevent axial symptoms [6]. The range of laminectomy or laminoplasty should be carefully planned, for the adjacent laminae may compress the spinal cord after its posterior shift.

In those cases with lesions involving 3 or fewer levels, I prefer an anterior approach. Anterior approach has the advantage of improved outcome and long-term benefit, especially when the occupying ratio is larger than 50 % [7, 8]. AA has less blood loss than PA under similar condition, which means AA is more reasonable for patients with poor general condition. In a posterior procedure, even precisely cut through the middle line with controlled low blood pressure, bleeding from the muscle can still be considerable, especially in patients with diabetes mellitus (personal experience).

We have published an article in *European Spine Journal* on indication and technique of AA for OPLL with an occupying ratio exceeding 50 %. Utilizing the anatomic feature of *open-based* OPLL, removal of the ossified mass without touching on dural sac and spinal cord could be achieved by AA [9]. AA got an improved outcome when complications and risk are minimized.

Cases with extensive OPLL and kyphosis are the most difficult to deal with. For this kind of patients, 1–2 levels corpectomy to restore normal alignment combined with laminectomy or laminoplasty may be optimal. Further consideration is about one-stage or two-stage, and AA first or PA first, which still needs evidence to draw a conclusion.

Laminectomy or laminoplasty

Laminoplasty is more popular these days. This technique promises stability of cervical spine without fusion, and has lower complication rate of axial pain and postoperative kyphosis, comparing to laminectomy [10]. Some authors consider a limited laminoplasty to decrease the extent of spinal cord drift, and therefore decrease the risk of C5 nerve root palsy. In this case, auto-fusion of cervical spine had already happened and even laminectomy would not impair the stability.

Procedure

The authors did a great work in performing a standard laminectomy from C3–6. Personally, I use a specially made custom-made cast brace to support the patients' head, neck and upper chest, which is an old fashion technique but gives a better support to the neck. Pulling down the upper extremities caudally to lower the shoulder helps exposure, especially at the C6 and C7 level. The surgeons did en bloc laminectomy in this case. It can be hard to achieve in some cases, where the dural sac strongly adheres to the lamina and the ligament flavum. Laminectomy can be done by dividing the laminae into pieces and leaving some islands of bone or ligament.

Personal preference

I would do the same procedure in this case. If the extension of OPLL was >4 levels, an attempt of anterior removal would be tried for the ossification is *open-based* as Fig. 2B and 2C demonstrated [1]. Another benefit of anterior approach in this case was that the anterior osteophyte could be removed. Large osteophyte anterior to the vertebrae may cause dysphagia.

Conclusion

Extension of the ossified mass may be the most important factor to choose the approach for surgical treatment of OPLL. High non-fusion rate impaired the results of anterior approach when it was applied for 4 or more levels. Anterior approach should be tried in cases of OPLL with limited extension, as it yields better outcome. Surgeon's experience and skill are also factors that should be considered in the choice.

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