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Lumbosacral extradural arachnoid cysts: diagnostic and indication for surgery

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Abstract No critical discussion of the indication for the surgical treatment of lumbosacral extradural arachnoid cysts is found in the literature. Therefore, we want to compare the results in patients with operative and conservative treatment to define standards for a good surgical result. Over a period of 9 years, we operated on eight patients with a lumbosacral extradural arachnoid cyst and treated eight others conservatively. Only three of the operated patients experienced a postoperative relief of pain, but none was symptom free. The only one with continuing success had a preoperative history of

1 year only. MRI scans without contrast agent were misinterpreted in one included and one excluded case. The results of conservative treatment were nearly the same as those of operative treatment. MRI is the best diagnostic tool, but a variety of sequences must be used. Patients with a short pain history and a clear neurological deficit profited most from surgery. Patients with slight and not clearly related uncharacteristic symptoms should be excluded from surgery.

Key words Lumbosacral extradural arachnoid cyst · Low back pain · MRI · Cerebrospinal fluid flow

Introduction

Perineural [3, 6, 7, 23, 35, 39, 43, 45–47, 53] or lumbosacral extradural [5, 12, 15, 16, 25, 38, 50] arachnoid cysts can take the form of space-occupying cystic dilations of the lumbosacral nerve roots at or distal to the junction of the posterior root and the dorsal ganglion. Both terms are used for the same entity. They are a rare disease. Although this entity has been known since 1937 [16], there are only a few publications describing the clinical course of more than one or two cases [7, 24, 36, 45, 47]. In 1959 Nugent reported on seven surgical cases [31]. Recently, Kendall et al. discussed six of their own cases of operated extradural arachnoid cyst, but only two of them were situated in the lumbosacral region [24]. Palmer studied the frequency of spinal arachnoid cysts at the Department of Neurosurgery at the Radcliffe Infirmary in Oxford (UK) in the years 1938–1970, and found only one extradural lumbar arachnoid cyst [32]. The clinical significance remained doubtful [9, 34].

The availability of MRI has resulted in an increasing number of patients with incidentally diagnosed extradural arachnoid cysts. A total MRI incidence of 4.6% and 1% with symptoms is reported [34]. The higher number of nearly 10%, cited by Xiao in another myelographic study, includes very common small radicular abnormalities [51]. Patients may suffer from different types of low back pain and sciatica. No critical discussion of the indication for surgery has been found in literature so far. Our aim was to compare the results in patients with operative and conservative treatment to define standards for a good surgical result. On account of the low frequency of this entity a prospective study is impossible.

Materials and methods

The clinical records of all patients with a lumbosacral extradural arachnoid cyst attending the neurosurgical department of our hospital in the years 1987–1995 were surveyed. Over these 9 years we operated on 2995 patients with lumbar space-occupying lesions. In

Fig. 1A–C Case 1. **A** T2-weighted MR image. The upper process is a neurinoma, the lower one the arachnoid cyst. **B** Myelogram shows the arachnoid cyst which is communicating with the cerebrospinal fluid space. **C** CT scan after myelography shows the neurinoma in the os sacrum

Fig. 2 Large non-communicating arachnoid cyst on myelogram

the same period we treated 16 patients with lumbosacral extradural arachnoid cysts, 8 of whom were operated. The remaining eight patients were either not operated on (conservative treatment) or were successfully operated because of other reasons, e.g. lumbar intervertebral disc prolapse responsible for radicular pain at a different nerve root.

The group surveyed in this report consists of nine women and seven men. Mean age was 45 years (range 38–69 years; median 52 years for the operated group, 49 years for those not operated). Follow up is 2–8 years.

Results

Operative group ($n = 8$; mean age 52 years)

All surgically treated patients underwent a lumbar myelography. In five of these, a communication (Fig. 1B) was clearly demonstrated by myelography and at operation. In one case we found a cerebrospinal fluid (CSF) inflow at surgery, although myelography had shown none. The surgeon therefore suspected a valve mechanism. Two surgically treated patients had no communication neither on myelogram (Fig. 2) nor at the operative situs. The cyst di-

ameter varied between 1.5 and 5.0 cm. Six cyst were on the right side and 2 on the left. The duration of the symptoms ranged from 3 weeks to 10 years.

Four of the surgically treated patients suffered from objective neurological deficits: three had hypaesthesia, four showed asymmetric reflexes of the leg, two had a pathological electromyogram and two had objective miction disorders. One man was impotent, although we did not find any clearly defined neurological reason. A painful history related to the lumbosacral nerve roots was reported by four of these patients. One suffered from coccygodynia.

In three cases the cyst was extirpated completely, in five others the cyst was partially resected and tightly closed. In order to achieve tight conditions, we sutured the original dura in three cases, in another three cases we used lyophilised dura and in two further cases we applied a muscleflap.

Two patients were first operated at the level of a lumbar disc. Failed back syndrome with remaining pain led to a second operation of the subsequently diagnosed sacral extradural cyst. There was no satisfactory result in either case.

In total, only three patients experienced postoperative relief of pain, but none was symptom free. Two of them enjoyed an improvement for a short period only, but after 1 year and half a year respectively their problems were the same as before surgery. Further MRI studies showed no new cyst. The preoperative bone defect remained in all cases. One cyst was located at the L4 nerve root. The postoperative situation was characterised by increased pain. The only patient with continuing success had a preoperative history of only 1 year. He is the only one with such a short follow-up, and the only one with a good result after surgery.

Non-operative group ($n = 8$; mean age 49 years)

In six of the conservatively treated patients, the diagnosis was realised by myelography. Three of these patients were successfully operated for a lumbar disc prolapse. A communication was shown in four of these six patients by myelography. In two cases no information about a communication with normal subarachnoid space was available, as the patients refused a myelographic examination. The non-operative group had a history of symptoms ranging from 1 to 5 years at first admission to our hospital. The diameter of the cysts ranged from 2 to 5 cm. Two of the patients had cysts on both sides. Three were on the right and three on the left side. The leading clinical sign was low back pain or sciatic pain.

The patients treated conservatively had a wide variety of courses. Follow-up was characterised by cycles of improvement and deterioration. These patients accepted their symptoms once they knew their sacral cystic lesion was a possible cause. No increase in size was seen on the X-ray controls, and no significant new neurological deficit occurred.

Conclusive results

Both groups were of comparable age and the size of the cysts was comparable too. Each group had only one cyst of the largest diameter of 5 cm. The prediagnostic histories were also comparable.

No significant improvement was achieved by surgery. The conservatively treated patients, who accepted their symptoms, experienced the best course.

It should be emphasized that the differential diagnosis of such cysts should be done very carefully, as the following example will show.

Exemplary case reports

Case 1

A 69-year-old woman had suffered sciatica for almost 1 year, but had no neurological deficit. On MRI (T1- and T2-, but not proton density-weighted images), we found – as expected – two sacral arachnoidal cysts (Fig. 1A). On the myelogram one cyst had a communication with the remaining CSF space, the other did not (Fig. 1B). After the first operation on one cyst, all complaints remained. A subsequent operation on the other “cyst” revealed a neurinoma (WHO grading II–III). On MRI without contrast medium, these two entities cannot be distinguished on normal sequences. Only proton density sequences show a slightly different signal. In cases of degenerative disease such as disc prolapse, it is not usual to perform MRI studies with contrast agents in Germany.

The need for complete diagnostic studies in such cases underlines the following additional case, not from our series.

Case 2

A young woman had been treated conservatively over a period of 4 years in an orthopaedic hospital for a large “lumbosacral extradural arachnoid cyst”. Diagnosis had been supported by MRI examinations without contrast agent every year. In the myelogram, no contrast agent entered the “cyst”. MRI with contrast agent and MRI CSF-pulsation imaging showed a solid tumour, and no cyst! Surgery had an uneventful course. Histological examination revealed a chordoma.

Discussion

According to the literature, MRI is the diagnostic tool of choice in patients with a lumbosacral extradural arachnoid cyst [3, 5, 13, 20, 22, 28, 29, 38, 47, 48]. Our experiences in preoperative imaging prove the validity of MRI with contrast agent in the diagnosis of this entity. Three standard sequences, is the minimum requirement, and additional CSF-pulsation imaging [8, 18, 26, 27, 41] is helpful. A visible intracystic pulsation excludes a tumour (neurinoma), which, with slight contrast enhancement, may sometimes appear to be a cyst [47]. Myelography is useful, but not always the best way to show the cyst on account of the unpredictable communication [10, 21, 23, 33, 38] (Figs. 1B, 2B). In accordance with our experience in diagnosing

cerebral arachnoid cysts, it might be useful to take later CT scans (Fig. 2C), up to 24 h after injection [24].

Our results of surgery are poor. Most reports in the literature cite good results. This is also the case for the rare reports of more than two or three cases [24, 36, 45, 47]. However, these reports are about arachnoidal cysts of the whole spine [24, 32, 36]. The results of cervical or thoracic cysts with compression of the myelon [14, 24, 32, 40] may differ [7] from findings in the low back, with compression of only one or two nerve roots.

Bourgeois et al., reporting on four cases, suggested the clinical signs may actually be exacerbated by an operative treatment of sacral perineural cysts [7]. There is no report analysing a greater number of lumbosacral cysts in adults. This may be related to poor results in these cases. No one wants to publish poor results, although these are necessary for an informed surgical decision. Standard books about the spine present no critical discussion about the surgical indication of lumbar arachnoid cysts.

On the other hand there are some reports of cysts in children or young adolescents. They cause pain or neurological dysfunction at an early stage [36, 37, 42], and are therefore detected early. These rarely diagnosed "occult intrasacral meningoceles" have a different clinical course than the late diagnoses our experiences came from. It may be necessary to distinguish large midline cysts, called occult intrasacral meningoceles, from laterally positioned cysts at the sacral roots. It is probable that they not only have a different clinical course, but that they represent a different pre- and postoperative entity. Yet another entity is the synovial cyst (juxta-facet cyst) [2, 17] and cysts from the ligamentum flavum [4, 30, 49]. These have best surgical results.

The nerve roots in our cases must be chronically compressed and histologically changed. This may be the cause of causalgia remaining or recurring postoperatively [52]. This interpretation of the bad results depends on there being a connection between pain and increased pressure within the cyst, not only a common cause [7]. Bourgeois

et al. [7] distinguish between intraneural cysts, which may be made worse by an operation, and a treatable extraneural compression.

Most authors recommend cyst removal with tightening of the base [15, 19, 44]. Our negative experiences show that this may not be the best way to do it. Other, less common treatment modalities are lowering the pressure by lumboperitoneal shunt implantation [11], or the simple method of percutaneous cyst puncture [34]. Puncture led to a temporary reduction of the symptoms of up to 6 months. The role of an additional blood injection, which was successfully used in our group for postoperative pseudomeningocele, has still to be discussed.

The aim of our own surgical technique is to enable a free communication from the cyst to the CSF space, with a freed nerve root within the space. This will prevent pressure developing in the cyst, which should prevent a neurological deficit. This method, modified by a minimally invasive endoscopic technique [1], was presented in an earlier case report.

Conclusions

MRI is the best diagnostic tool for detection of lumbosacral extradural arachnoid cysts. The MRI studies should be performed using contrast agents and a minimum of T1-, T2- and proton density-weighted images. This is essential to distinguish a cyst from a tumour. A tumour has to be operated on.

The decision to operate a laterally located cyst in the lumbosacral region should not be taken on account of an impressive X-ray finding, but from the clearly related neurological deficit and the pain history. Patients with a short pain history and a clearly related neurological deficit may have some, although at best only a slight, profit from an operation. New endoscopic techniques or a simple CT-guided puncture should be taken into consideration.

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