ORIGINAL ARTICLE

The role of surgery in the management of Pott’s disease in Yaoundé. A review of 43 cases

V.P. Djientcheu a, F.F. Mouafo Tambo b,*, I.S. Ndougsa b, N.J. Eloundou a, I.N. Kouna Tsala b, M. Ngowe Ngowe b, O.G. Andze b, M.A. Sosso c

a Department of neurosurgery, Yaoundé Central Hospital, PO Box 87, Yaoundé, Cameroon
b Department of paediatric surgery, Yaoundé Gynecology/Obstetrics and Paediatrics Hospital (YGOPH), PO Box 4362, BP 5790, Yaoundé, Cameroon
c Department of Surgery and Medical specialities, Yaoundé Faculty of Medicine and Biomedical Sciences I (YFM&BIS), Yaoundé, Cameroon

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Laminectomy;
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Tetraplegia;
Mycoplasma tuberculosis;
Spinal tuberculosis

Summary
Introduction: Pott’s disease is a common entity in our hospital. The authors report their experience in the surgical treatment of Pott disease.
Patients and methods: This is a retrospective study including all patients who underwent surgery for Pott’s disease in our institution between November 1999 and November 2004.
Results: Forty-three patients were included, including 23 men and 20 women (ratio 1.15). Location of the disease was cervical (2 cases), dorsal (19 cases), dorsolumbar (2 cases) lumbar (16 cases) and sacrolumbar (4 cases). Ten patients were HIV positive (24%). The surgical indication was sometimes diagnostic, but predominantly therapeutic (medullary compression, instability or deformity). Spinal decompression alone was performed in 23 cases, associated with internal fixation of the spine (17 cases) or external immobilization (Halo Vest) in two cases. The anterior approach was used in four cases and a posterior approach in 38 cases. Decompression by posterior approach included 1 or 2 level laminectomy alone or associated with internal plate fixation (4 pedicle screws and 2 plates). There was no functional recovery in patients with a complete neurological deficit (Frankel A); those with a severe deficit (Frankel B) partially recovered, while those with more moderate deficits (Frankel C and D) recovered completely. Fusion was obtained (graft integration) regardless of the surgical approach used, progression of the deformity was stopped and early mobilization was possible.
Conclusion: Surgery definitely plays a role in the diagnosis and treatment of Pott’s disease, especially in countries where patients are seen at a late stage of the disease when complications have developed. Surgical decompression should not be delayed until lesions become ischemic and irreversible (Frankel A).
Level of evidence: Level IV. Retrospective study.
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* Corresponding author.
E-mail address: faustintambo@yahoo.fr (F.F. Mouafo Tambo).

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Introduction

First described in 1779 by Percival Pott, Pott’s Disease, or tuberculosis spondylodiscitis is the most frequent extrapulmonary, osteoarticular location of mycobacterium tuberculosis [1]. The spinal cord is infected by Mycoplasma tuberculosis via the lymph nodes or the blood. Although it is rare in the developed countries, in the developing countries with limited healthcare systems it is a concern, especially because of the continuing HIV pandemic that affects all ages of the population [2–4]. In children, Pott’s disease can be a primary infection and be located in the vertebra, resulting in discitis before progressing to spondylodiscitis; in adults Pott disease is usually secondary to a lesion of primary tuberculosis. New molecules have been developed for classic medical management with antituberculosis drugs. However, the development of resistance to treatment associated with what is usually a late diagnosis in the developing countries [5], has returned surgery to the list of therapeutic options both for diagnosis and precise therapeutic indications. Thus, the goal of this study was to report our experience and define the role of surgery in the management of Pott’s disease, especially in our particular context.

Patients and methods

This analytic, descriptive, retrospective study was performed from November 1999 – November 2004 in the neurosurgery department of the Central Hospital of Yaoundé (40 cases) and the pediatric surgery department of the Gyn-Obstetric and Pediatric Hospital of Yaoundé, Cameroon (3 cases). All patients who underwent surgery for confirmed (histological or bacteriological) Pott’s disease were included. Patient files were recovered from the archives and operating room registers were consulted (surgical protocols). Patients presenting with confirmed Pott’s disease who received medical treatment only (diagnosis from an extraspinal lesion in a patient without neurological complications or alignment disturbances) were excluded from the study.

The preoperative evaluation included standard X-rays, myelography or CT scan of the spine depending on where the patient and his/her general physician were from. Criteria for spinal cord compression were clinical and radiological: this included significant narrowing of the spinal canal (disappearance of the perimedullar spaces) on imaging associated with a neurological deficit, or very severe narrowing of the spinal canal associated with a neurological deficit, even minor. Instability was taken into account when in addition to the injury to the disc, there was lysis of the adjacent vertebral end plates, resulting in collapse of the vertebrae of more than 50% (Fig. 1) or an associated deformity (Fig. 2). All of the patients were treated with an antituberculosis drug protocol for 9 months. This included a four-drug combination (Isoniazide, Rifampicine, Pyrazinamide, Ethambutol) for 2 months followed by a two-drug combination (Isoniazide, Rifampicine) for 7 months.

Patients were classified preoperatively and postoperatively according to the Frankel classification (Table 1) after a follow-up ranging from 9 months to 4 years. The variables for each patient included: age, gender, topography of spinal lesions, predisposing factors (BCG vaccination, HIV serology, pre-existing tuberculosis, progressive tuberculosis), the diagnostic techniques, surgical indications, surgical technique, neurological condition before and after treatment. Epi info software was used to perform the statistical analysis.

Results

During the study period, 43 patients were included with 23 men and 20 women (ratio: 1.15). The incidence of Pott’s disease in the hospital was eight cases per year (neurosurgery department). The mean age of patients was 38.9 years old (10 – 69).

The time to diagnosis was less than 6 months (16 cases), between 6 and 12 months (10 cases), between 13 and 24 months (6 cases) or more than 24 months (11 cases). The location was cervical (2 cases), dorsal (19 cases), dorsolumbar (2 cases), lumbar (16 cases) and sacroliambar (4 cases). Ten patients were HIV positive (24%). Thirty-four patients did not have an up-to-date BCG vaccination. A lesion of progressive pulmonary tuberculosis was found in five patients. The neurological examination at admission showed a complete deficit in four cases and a partial deficit in 29 cases. Ten patients had no neurological deficit.

The diagnosis was confirmed by histological analysis of the surgical sample (42 cases) or needle biopsy (1 case). Pus culture in Lowenstein-Jensen medium was only performed in forms with a cold abscess (14 cases, or 35%). The results were positive in six cases (15%) and showed the presence of alcohol-acid-resistant bacillus (BAAR). Direct testing on pus samples was negative in all cases.

The indication for surgery was spinal cord compression or cauda equina syndrome (in 23 cases), compression associated with an alignment disorder (Kyphoscoliosis) or instability (19 cases) and for diagnostic purposes (needle biopsy in one patient). Spinal decompression alone was performed in 23 cases, associated with internal fixation of the spine (17 cases) or external immobilization (Halo Vest) in two cases. The anterior approach was used in four cases and the posterior approach in 38 cases. Decompression by posterior approach included a laminectomy (on 1 or 2 consecutive levels) alone or associated with internal plate fixation (4 pedicle screws and 2 plates) or Harrington rods (4

### Table 1: FRANKEL classification.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Complete loss of motor and sensory function below the lesion</td>
</tr>
<tr>
<td>B</td>
<td>Complete motor function loss</td>
</tr>
<tr>
<td></td>
<td>Sensory function</td>
</tr>
<tr>
<td></td>
<td>Present below the lesion</td>
</tr>
<tr>
<td>C</td>
<td>Residual motor function</td>
</tr>
<tr>
<td></td>
<td>That is un-usable</td>
</tr>
<tr>
<td>D</td>
<td>Subnormal motor function</td>
</tr>
<tr>
<td></td>
<td>That can be used</td>
</tr>
<tr>
<td>E</td>
<td>Normal</td>
</tr>
</tbody>
</table>
The role of surgery in the management of Pott’s disease in Yaoundé

Figure 1 On cases of lumbar Pott’s Disease with partial lysis of L3 and L4 treated by a posterior approach (spondylodesis L2–L4, laminectomy L3 and L4, bilateral posterolateral bone graft). CT Scan reconstruction (a), postoperative AP view (b) and profile view (c).

cases). The anterior approach (Fig. 3) included a corpectomy (sequestrectomy), followed by an interbody iliac crest bone graft and plate fixation (3 cases) or external immobilization (Halo Vest) in one case.

Patients were evaluated preoperatively and postoperatively using the Frankel classification (Table 1) with after between 9 months and 4 years of follow-up. There was no functional recovery in Frankel A patients (4 patients) after surgical treatment. In the 14 Frankel B patients, there was neurological improvement in 10 patients who became Frankel D [6] or E [7]; all Frankel C (6 patients) and Frankel D patients (9 patients) recovered completely (Frankel E). Radiological follow-up showed fusion of the involved segments (12–18 months) whatever the approach (interbody graft or posterolateral graft). Internal fixation was found to result in a reduction in spinal pain, early mobilization, the stopping of disease progression (no additional collapse) and even in certain cases a slight correction.

Discussion

The frequency in our series of eight cases of Pott’s Disease per year in our hospital is probably underestimated, because of the low socioeconomic level of the local population resulting in limited access to reference healthcare centers. In addition, the HIV pandemic, the limited medical imaging technical platform, as well as the difficulties of prevention and early testing in our situation explains why this frequency could be higher than it seems to be. The mean age of patients (38.9 years old) in this study is close to the 41.1 years old reported by Sanoussi et al. [8], and the presence

Figure 2 One case of dorsal Pott’s disease with T5 and T6 lysis, severe angulation compressing the spinal cord in front where it is convex, while the retromedullary space is free; this is an indication for an anterior approach at the thoracolumbar level or anterior debridement, even if it does not reduce the kyphosis, frees the angulation and the pressure on the spinal cord: CT reconstruction sagittal (a) and axial (b) views.
of pediatric cases shows that TB spondylodiscitis concerns people of all ages in the population. The higher proportion of men observed in our study has already been reported by other authors [7,9] as well as the main predisposing factors including a lack of BCG vaccination, positive HIV and progressive pulmonary tuberculosis. Diagnosis was mainly surgical in our study since most of the patients consulted late and already had signs of spinal cord compression or instability. In addition, because of the negative BAAR results in the different samples (sputum, pleural fluid etc.), which is fairly frequent in our environment where tuberculosis is endemic, diagnosis was made during surgery in most cases. This choice is further justified because although CT scan is available in our practice, it has the disadvantage of being expensive and there are very few MR imaging devices available, or none at all. Although modern imaging has become sensitive and specific for the diagnosis of Pott’s Disease [1,4,10,11] at an advanced stage of bone deterioration, the neoplastic and non-neoplastic osteolytic processes can make a diagnosis difficult [12]. Histological tests were specific (epithelioid granuloma, caseousnecrosis) and more sensitive than testing for BAAR in samples (direct testing and culture in Lowenstein Jensen medium). Polymerase chain reaction (PCR), which improves the sensitivity of bacteriological tests, is not yet available in our hospital. The indication for surgery in our series was for two purposes — diagnostic and especially therapeutic in the presence of significant spinal cord compression or instability. These surgical indications show that the diagnosis of Pott’s disease is delayed in our country and explains the more invasive approach taken in other series in developing countries [2,4,8,13,14]. Diagnosis is delayed because before patients finally consult at a specialized hospital, they first lose time consulting in small healthcare centers and with traditional practitioners. However, surgery is still a controversial option for certain authors [15] who do not feel that there are additional long term benefits to resecting all necrotic tissue and trapped bone fragments compared to standard antituberculosis treatment. However, in countries where patients are seen at the stage when complications have developed, this statement should be more measured. Indeed surgery is still indicated in patients with severe neurological deficits, when medical treatment fails, in spinal deformities or when repeat percutaneous needle biopsy does not provide a diagnosis [12]. Moreover, surgery associated with bone grafts and antituberculosis treatment increases the frequency of fusion of the infected areas and results in good spinal fusion, without increasing and sometimes even correcting kyphosis [16]. The surgical approach used in our series was usually posterior, because most of the cases of Pott’s disease were dorsal and lumbar and also because with this approach the spinal cord can be exposed with limited debridement. The anterior surgical approach at an angle to the marrow (medullary cavity) was mainly used in cases of anterior spinal compression (bone sequestered in the canal or deformities) (Fig. 2). This strategy has been supported by other authors [9,10]. Healing of the infected area was obtained, whatever the approach used, showing that resection of the infected area is not absolutely essential to obtain healing and bone union. However, surgery allows spinal decompression (improving the functional prognosis), stabilization, and also prevents worsening of the deformity and reduces pain during treatment (allowing early mobilization). Certain authors support this strategy [6,9,10,13]. Spinal decompression was associated with spinal fusion with plate fixation (two plates, four pedicle screws and screws and posterolateral bone grafts) in 17 cases (40.5%) in our series. On the other hand Sanoussi et al. [8] performed an interspinous cerclage for the same indications which is inexpensive and simple, however patients must remain in bed for one month and weightbearing and re-education is performed wearing a lumbar belt.

Thus surgery should be considered as a therapeutic option in the management of Pott’s disease, even though for Al Kalita et al. [11], the problem of treating Pott’s induced paraplegia is not, and may never be, resolved. From a physiopathological perspective, neurological structures are contained in a rigid framework of bone (the spinal canal). Increasing the volume of the contents in the canal (abscess, inflammation, or bone fragments) probably increases intraspinal fluid pressure (which is a well known phenomenon in the skull), resulting in a reduction in medullary perfusion pressure and ischemia. The lack of

**Figure 3** One case of Pott’s Disease at C5 and C6 in a tetraplegic patient (sensory function preserved) operated by anterior approach (debride and intersomatic graft); cervical CT scan (a), sagittal reconstruction (b), 6-month postoperative follow-up (c).
recovery in Frankel A patients shows that these are probably post-ischemic lesions. The most important factor for the functional prognosis in this series was the neurological condition of the patient at surgery. Frankel A patients did not recover, Frankel B patients didn’t recover, or recovered partially, while Frankel C and D patients recovered completely. The presence of HIV co-infection in Frankel B patients who did not recover suggests that the immune system may also influence the functional prognosis because of the progression of viral myelitis, independently of the mechanical factors of spinal compression.

Although the postoperative neurological outcome was correlated to the delay in diagnosis, the location of disease (cervical, dorsal, lumbar) and the surgical technique, the severity of the neurological deficit at surgery (Frankel A et B) was the most significant prognostic factor. The use of internal fixation and a bone graft in an infected milieu has long been considered a limiting factor to this strategy. In the case of Pott’s disease, series increasingly report [2, 8, 16] good tolerance and graft integration. In our series the use of internal fixation and grafts in the infected area (anterior approach) or near the infected area (posterior approach) did not cause any specific problems.

Conclusion

Although appropriate medical antituberculosis therapy is still the basis of treatment of tuberculosis in general and of Pott’s disease in particular, surgery still plays a diagnostic and therapeutic role especially in countries where patients consult at a late stage after complications have developed (spinal compression, deformity and instability). The severity of the neurological deficit at surgery is an important prognostic factor. Surgical decompression should not be delayed until there is a total neurological deficit, which signifies the presence of irreversible, ischemic lesions (Frankel A).

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References