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# Pott's Disease and Extrapleural Anterior Decompression

## Results of 108 Consecutive Cases

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**Summary.** Between 1973 and 1988, 108 patients with a preoperative diagnosis of spinal tuberculosis were treated by anterior extirpation and interbody fusion at Ankara University Medical Faculty, Orthopedic Surgery and Traumatology Department. In 96 cases the operations were performed intrapleurally, as Hogston described. For 12 patients who had spinal involvement at lower thoracic and upper lumbar segments an extrapleural and extraperitoneal approach was used. The extrapleural approach is strongly recommended for patients who have compromised pulmonary reserve. When this approach is used adequate exposure can be obtained and postoperative rehabilitation of patients is facilitated. Advantages and disadvantages of the extrapleural approach and the results obtained from 108 patients are presented.

Ito et al. reported an anterior approach to the spine in 1934 [15]. In 1950, Wilkinson presented his paper about treatment of spinal tuberculosis by costotransversectomy and curettage [28]. In the 1960s, Hogston and his colleagues popularized anterior extirpation and strut graft interbody fusion [13, 14]. This surgical technique has made it feasible to extirpate a tuberculous focus within the spine effectively.

Between 1973 and 1988 we performed 108 operations involving anterior extirpation and interbody fusion on patients with preoperative diagnoses of spinal tuberculosis; the results fo these 108 consecutive cases are presented with a special emphasis on the extrapleural approach.

The extrapleural approach was selected for patients who had pulmonary dysfunction or compromised pulmonary reserve (S. Yavuzer, personal communication). This technique provided adequate exposure during surgery and lowered the postoperative morbidity of patients significantly [17].

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### Clinical Material

Of the 108 patients, 56 (51.8%) were female and 52 (48.1%) were male. They ranged in age from 4 to 61 years (mean 34). The diagnoses of spinal tuberculosis were confirmed by pathological and microbiological evaluation.

The tuberculosis was localized at C4–7 in nine patients (8.3%), at T1–4 in six (5.5%), at T4–11 in 57 (52.7%), at T11–L1 in 24 (22.2%), and at L2–5 in 12 (11.1%).

In 89 patients (82.4%) the tuberculous focus was a single vertebral body; in 18 patients (16.8%) two vertebral bodies and in one patient more than two vertebral bodies were involved. Forty-three patients (39.3%) had visible abscess formation diagnosed roentgenographically, and two patients had draining fistulas.

Fifty-one (47.2%) patients had neurological symptoms ranging from dysesthesia to complete paraplegia; in 32 (29.6%) complete paraplegia was the initial symptom. In eight patients whose mean age was 30 years the primary symptom was pain. The severity of kyphosis was graded according to Kaplan's classification using the preoperative roentgenograms [1]. In 54 (50%) patients kyphosis between 0° and 30° was graded mild, in 38 (35.1%) patients kyphosis between 30° and 60° was graded moderate, and in 16 (14.8%) patients kyphosis of more than 60° was graded severe. The patients in the last group were admitted to the hospital with complete paraplegia. Kyphosis was localized to the thoracic segment in the majority of the patients.

Preoperatively, nine (8.3%) patients had scoliosis. Curves were measured using Cobb's method: six (5.5%) patients who had curves between 0° and 15° were graded mild; three (2.7%) had curves between 15° and 30° and were graded moderate [1]. In most, scoliosis was due to more destruction of one side of the vertebra than the other, as mentioned by Bailey et al. [1]. Eleven (10.1%) patients had pulmonary and articular tuberculosis in addition to spinal involvement.

## Treatment

### *Medical*

Patients whose diagnoses were confirmed by microbiological and pathological examination were started on the medical treatment protocol shown in Table 1. Follow-up of our patients' medical treatment was carried out by widely distributed and highly organized tuberculosis health centers in our country.

### *Surgical*

Patients were operated on with different approaches, determined by the localization of involved segments [6]. Spinal involvement at C4–7 was observed in 8.3% of the patients, and Cloward's technique was used for interbody fusion. The 5.5% of patients who had spinal involvement at T1–4 were operated on using a left-sided periscapular approach with resection of the third rib. Patients who had involvement at T4–11 were operated on with the apex of the kyphosis serving as a landmark, and one rib above the apex was resected. The patients who had involvement between T-11 and L-1 (22.2%) were operated on using Fey's or Digby's approach. Involvement at L2–5 was observed in 11.1% of the patients, and these were operated on via a classic renal approach.

The surgical technique for the extrapleural approach is as follows: The patient is placed in lateral decubitis; taking the apex of the kyphosis as a landmark, one rib above the apex is marked, and a posterolateral incision is made. The anterior fibers of the serratus anterior muscle are identified and the rib is exposed. After incision of the periosteum with cautery, a subperiosteal dissection is carried out, and the rib is freed of the intercostal muscles (Fig. 1). After resection of the rib, the parietal pleura under the periosteum should be defined. By blunt dissection the parietal pleura is separated from the inner surface of the thoracic cavity. The lung on this side is deflated and the plane of cleavage is extended gently posteriorly, without tearing of the parietal pleura (Fig. 2). Segmental arteries and veins are ligated as they are seen. When the invovled spinal segment and abscess cavity are reached, all necrotic bone and sequestra are excised using a chisel, ronguer, or osteotome. Using the resected rib as a strut graft, spinal fusion is performed. This approach was preferred when spinal involvement was at the thoracolumber junction, and exposure was facilitated by dissecting the prediaphragmatic connective tissue space and entering the retroperitoneal space [23]. Before closure of layers a dynamic suction drain such as Hemovac is placed in the extrapleural space; it is removed after 36–48 h.

Patients were mobilized postoperatively using a steel-supported brace extending from the axilla to the iliac crests. The mean time to mobilization was 16 days; the mean length of postoperative hospitalization was 19 days.

**Table 1.** Medical treatment protocol

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|---|
| Streptomycin 1 g/day for patients younger than 60 years old; for children 20 mg/kg<br>Recommended dosage is administered daily for 30 days, every other day for 20 days, and twice a week for 35 days |
| Isoniazid: 5 mg/kg daily for adults, 15 mg/day for children |
| Rifampin: 10 mg/kg daily for adults or 600 mg/day<br>For children 15 mg/kg daily |
| Ethambutol: 15 mg/kg daily (not used for children) |
| Pyrazinamide: 30 mg/kg daily (used only for 2 months) |

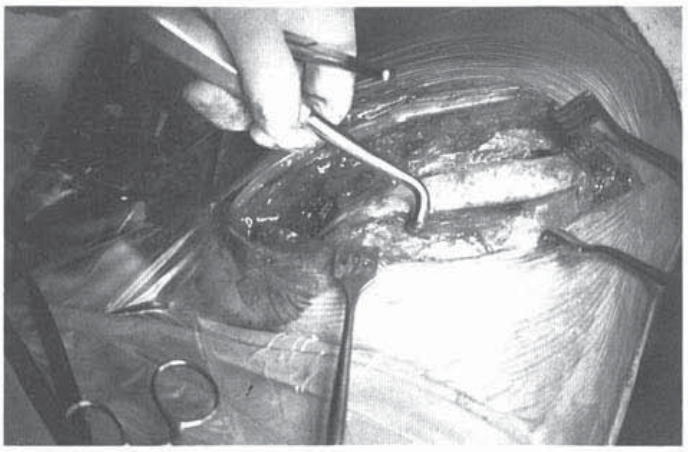

**Fig. 1.** Subperiosteal dissection of intercostal muscles during removal of the rib

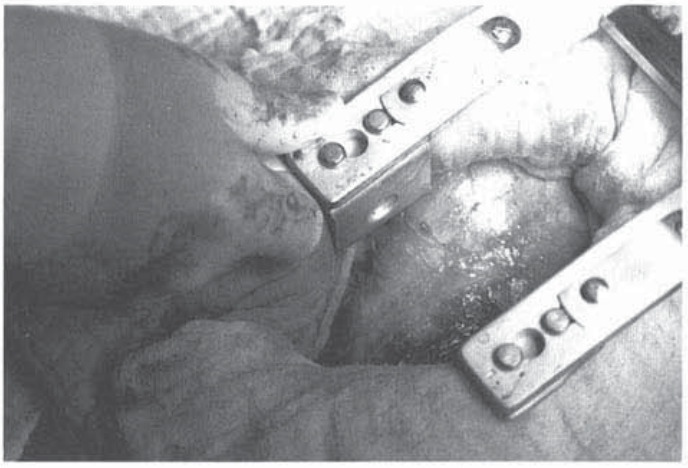

**Fig. 2.** Exposure of the parietal pleura and dissection for adequate anterior decompression

## Results

The mean follow-up period of our patients was 36 months (10–42 months). Patients were followed up every 3 months during the first postoperative year, then twice annually for 2 years; after 3 years patients were examined annually.

Five patients died within 13 days after surgery. Two of these deaths were due to pulmonary embolism, confirmed during necropsy, and one death was due to myocardial infarction. Necropsy was not performed on the other two patients as no permission could be obtained from their families.

Nineteen of the paraplegic patients had complete neurological remission and five had only partial remission. Two patients had postoperative superficial wound infections which were treated successfully by local wound care and appropriate antibiotics. Two patients

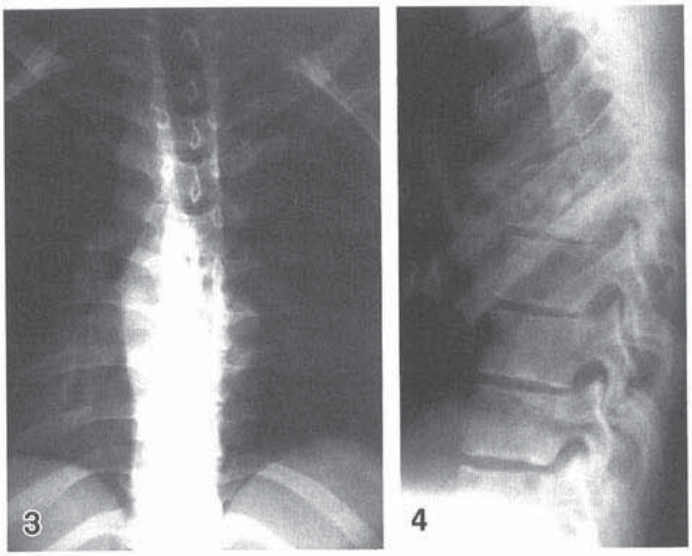

**Fig. 3.** AP roentgenogram of a patient with Pott's disease and abscess at T-9

**Fig. 4.** Lateral roentgenogram of the same patients as in Fig. 3

who had spinal involvement of the upper thoracic segments and were operated on via the extrapleural approach developed pleural effusions; these were treated by thoracentesis.

## Discussion

The most important indication for anterior extirpation and interbody fusion in cases of spinal tuberculosis is paraplegia. Paraplegia usually accompanies involvement of the thoracic segments [2, 4, 10, 12, 16, 27]. Narrowing of the spinal canal, sequestrum, and mechanical compression of the cord by an abscess are the leading causes [1, 7, 9, 10]. Thrombosis of the spinal cord arteries, fibrosis of the dural sac across the cord, and interstitial gliosis due to spinal cord involvement are other probable factors [14, 24]. In our series paraplegia was observed among 29.6% of the patients; rates reported for other series range between 5% and 25% [2, 3, 5, 10, 11, 14]. Bailey et al. reported 3% paraplegia among children due to spinal tuberculosis [1]. A positive correlation was found between postoperative remission of paraplegia and beginning of neurological involvement before operation, but we were unable to confirm such a correlation [1, 8, 18, 22, 25].

Mortality is reported to be between 8% and 23% [8, 14, 18, 21, 26]; in our series early mortality was 4.6%. As antituberculosis organizations are distributed nationwide, the disease can be diagnosed at an earlier stage, and patients' compliance to the medical treatment protocol can be followed-up rigorously.

Patients who were treated operatively may show some progression of their kyphosis at follow-up. After medical treatment of vertebral tuberculosis kyphosis may progress 10° every 5 years [19]. Bailey et al. reported that postoperative progression of kyphosis was 16° every 5 years [1]. After a follow-up of 10 years, Hogston et al. reported progression of kyphosis to be moderate [14]. During the postoperative follow-up period our patients did not show a remarkable progression of kyphosis. This satisfactory result was probably due to correction of kyphosis during surgery by hyperextension of the spine before placement of grafts, using heavy autogenous grafts and steel-supported braces for at least 1 year. Another indication for surgical intervention in spinal tuberculosis is abscess formation; abscess formation was symmetrical in the majority of our patients.

The extrapleural access which we have described is used to approach the lower thoracic spine in children, but it is not used frequently in adults [6]. In the clinical experience we have gained with 12 patients, we have observed that the extrapleural approach may be used for patients who have compromised pulmonary reserve due to tuberculosis sequelae or chronic obstructive lung disease. As the thoracic cavity is not entered, chest tubes drainage is not necessary, and as patients can be mobilized and rehabilated more effectively,

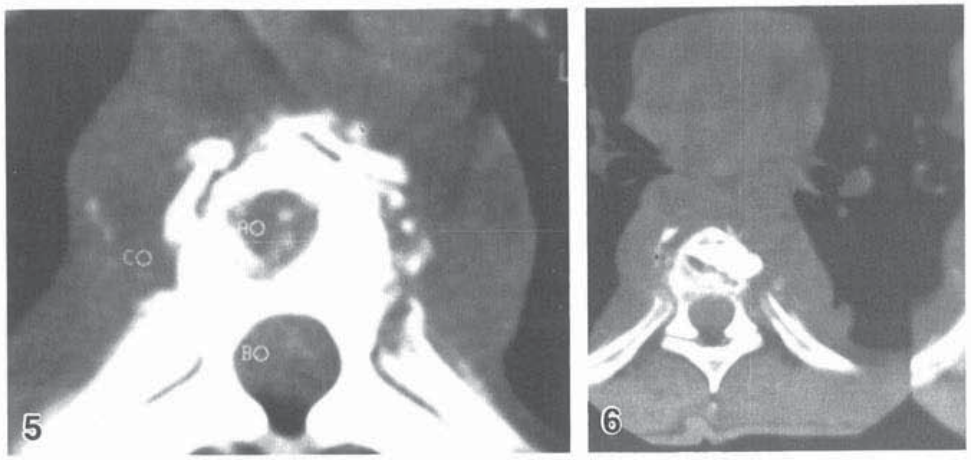

**Fig. 5.** Preoperative computer tomogram of the same patient, showing marked destruction of the vertebral body

**Fig. 6.** Postoperative tomogram of same patient, showing extent of anterior excision

postoperative pulmonary complications are significantly lower. Since it is less traumatic than the conventional techniques, patient compliance is better. Retropleural vascular structures are easily identified during the procedure and accidental injury to major vessels is less likely. However, this technique is not suitable for cachectic and elderly patients because the parietal pleura is thin and can be damaged even during gentle dissection; remnants of the resected rib can also damage the parietal pleura. The extrapleural approach is not recommended for access to upper thoracic segments, because drainage of the abscess into the mediastinum is a serious complication (S. Yavuzer, personal communication). Rakitanskaya reported that a combination of the extrapleural and the extraperitoneal approaches can be used at the thoracolombar junction [23]. In view of the satisfactory results we observed in a limited number of extrapleurally approached patients, this technique may be used in particular for tuberculous involvement of the lower thoracic spinal segments if the indications are present.

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