Anterior interbody fusion for cervical osteomyelitis

Reversal of quadriplegia after evacuation of epidural spinal abscess

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SUMMARY Interbody fusion for stabilization of the cervical spine after osteomyelitic destruction of the body of C5 vertebra is reported in a patient with quadriplegia and sphincter disturbances secondary to an epidural abscess. The successful union of the bone graft along with complete neurological recovery after anterior decompression and evacuation of the epidural mass seem to justify the procedure.

The management of cervical osteomyelitis complicated by spinal epidural abscess was reviewed in a number of papers (Allbrook, 1949; Durity and Thompson, 1968; Hutton, 1956; Rimalowski and Aronson, 1968), stressing the extreme urgency of the condition and the generally disappointing results of surgery. The standard posterior approach by laminectomy was generally used to decompress the spinal cord.

When, however, the epidural abscess develops in association with a compression fracture and dislocation of the vertebral body due to osteomyelitic destruction as in the following case, the posterior approach is obviously inadequate for a thorough debridement. The successful treatment of an epidural spinal abscess complicated by osteomyelitic destruction of the C5 vertebral body by the anterior approach is presented. An autogenous bone graft was used to fill the gap caused by the removal of the destroyed vertebral body and adjacent discs. The satisfactory union of the bone graft and the remarkable neurological recovery prompted this communication.

CASE REPORT

The patient was a 26 year old soldier wounded during action by bazooka fragments in the face, neck, shoulders, and right upper arm. Tracheostomy and enucleation of the right eye had been performed at another hospital along with local cleansing of the wounds under penicillin and streptomycin cover. Radiographs of the cervical spine at the time of admission (7 June 1969) showed multiple metallic foreign body fragments with one fragment anterior to the anterosuperior margin of C5 vertebra. There

was questionable minimal swelling of the prevertebral soft tissues at this level (Fig. 1). At this time the patient complained of neck pain radiating to both shoulders and upper arms. Re-examination of the cervical spine on 22 June 1969 showed definite erosion of the anterior margin of C5 vertebral body with marked anterior displacement of the previously described metallic fragment (Fig. 2). The patient left hospital on 29 June 1969.

FIG. 1. Lateral projection of the cervical spine (7 June 1969) showing multiple metallic foreign body fragments in the soft tissues with a single layer fragment adjacent to the anterior superior aspect of C5 vertebra. There is probably minimal widening of the prevertebral soft tissues.

FIG. 2. *Re-examination of the cervical spine (22 June 1969), approximately two weeks later showing early destruction of the anterosuperior margin of C5 vertebra and marked anterior displacement of the aforementioned metallic fragment by a soft tissue mass.*

He was readmitted on 13 July 1969, because of progressive neurological deterioration characterized by bilateral paraesthesias and pain in both upper extremities, absent biceps and triceps reflexes bilaterally, weakness of both shoulders, arms and hands, spastic paraparesis, and double sphincter weakness.

Myelography on 15 July 1969 (Fig. 3) demonstrated a pathological fracture of C5 vertebra with a complete block and posterior displacement of the Pantopaque column at the upper border of C6 vertebra, indicating an abscess in the anterior extradural space. At the time of myelography, lumbar puncture disclosed xanthochromic spinal fluid with a protein of 150 mg/100 ml. The patient was placed in skeletal traction and transferred to the Neurosurgical Department at Ichilov Hospital on 16 July 1969.

Physical examination upon arrival showed a thin, alert cooperative male with a healed tracheostomy scar and enucleation of the right eye. There were also multiple skin scars from shell fragments. His temperature was 38°C, pulse rate 100/min. The remainder of the routine physical examination was normal.

NEUROLOGICAL EXAMINATION The cranial nerves were intact. There was atrophy of the proximal arm muscles and a complete lower motor neurone

(a)

(b)

FIG. 3. *Anteroposterior (a) and lateral (b) projections during myelography demonstrating a complete block at the upper border of C6 vertebra and a pathological fracture of C5 vertebra. The anteroposterior view shows slight displacement of the theca to the right; the lateral view shows posterior displacement of the theca by a mass anterior to the cord. In the presence of osteomyelitis of C5 vertebra this is indicative of an anterior extradural abscess.*

paralysis of both arms without sensory disturbances, along with weak residual movements of the shoulders. The deep tendon reflexes in the arms were normal. There was spastic paraparesis with more pronounced weakness of the left leg, active tendon jerks in the legs with sustained patellar and ankle clonus, and bilateral Babinski signs. Superficial abdominal reflexes were present bilaterally.

LABORATORY DATA The blood showed a sedimentation rate of 56/85 mm (Westergren), haemoglobin 10.9 g/100 ml., haematocrit 36%, WBC 8,300/mm³ with a normal differential, glucose 110 mg/100 ml., blood urea nitrogen 44 mg/100 ml., chloride 108 m-equiv/l., sodium 152 m-equiv/l., potassium 4.2 m-equiv/l. The urinalysis was normal. On admission the patient was given penicillin 12 Mu intramuscularly, streptomycin 0.5 g b.d. and erythromycin 3 g intravenously.

On the night of admission he was operated upon under general, endotracheal anaesthesia. A transverse skin incision was made and, after dissection of the neck muscles, the trachea and oesophagus were retracted medially and the anterior surface of the vertebrae exposed. Upon opening the oedematous, bulging anterior longitudinal ligament, several pockets of pus were encountered in amorphous yellow-red granulomatous tissue which was dissected free to uncover the anterior surface of the vertebrae.

FIG. 4. Radiograph of the cervical spine (18 July 1969) showing the buttressing bone graft at C5 vertebra.

Fragments of destroyed bone of the body of C5 vertebra, disc fragments, and detritus were radically curetted out until healthy cancellous bony surfaces of C4 and C6 vertebrae were seen. Several minute pockets of pus and a filmy fibrinous coating were removed from the anterior surface of the dura mater.

A large iliac bone graft, modelled in the form of a vertebral body, was used to fill the empty space between the surfaces of the partially resected anterior C4 to C6 vertebral bodies (Fig. 4). The wound was closed in anatomical layers and a soft Penrose drain left in place for 12 hours. On the following day the bacteriological culture showed coagulase positive *staphylococcus aureus*, which was resistant to penicillin, sulphonamides, and achromycin, relatively resistant to streptomycin, and sensitive to chloromycetin, pyostacin, and celbenin. He was given

FIG. 5. Re-examination approximately five weeks after insertion of the graft (24 August 1969) showing some early resorption.

chloromycetin 1.0 g three times daily. Penicillin, erythromycin, and streptomycin were discontinued on the fifth postoperative day. Subsequently, varying regimes of chloromycetin, Penbritin, colimycin, and erythromycin were given for six months, the changes being made periodically without bacteriological control. The patient was afebrile and in good general condition from the sixth postoperative day.

Wound drainage stopped after one week and the wound healed with a clean scar. Marked neurological improvement was observed after the first

postoperative week. The skeletal traction was removed eight weeks postoperatively and two weeks later the patient was ambulatory with a firm chin-neck support. Neurological improvement continued and three months postoperatively no neurological deficit could be elicited. Control films of the cervical spine (Fig. 5) showed the expected initial resorption of the graft with subsequent recalcification of new-bone formation and bridging between vertebrae C4 and C5. Radiographs taken in December 1970 showed firm bridging of the implanted bone graft by new bone (Fig. 6).

DISCUSSION

Autogenous bone graft replacement in malignant disease of the cervical spine and tuberculous spondylitis with cord compression has been successfully accomplished in the past (Hodgson,

FIG. 6. Re-examination 22 months postoperatively (5 May 1971) showing re-ossification of the graft and partial fusion to C4 and C6 vertebrae.

Stock, Fang, and Ong, 1960; Mullan, Naunton, Hekmat-Panah, and Vailati, 1966; Seres, 1968). No reference was found in the available literature to successful use of this procedure in an actively osteomyelitic wound bed. Placing of a bone graft in these circumstances carries a high risk, since it may complicate the osteomyelitic process.

The successful union of the graft in our case was probably due to a number of factors: (1) careful eradication of any visible infected granulomatous and necrotic tissue; (2) exposure of healthy cancellous bony surfaces of the adjacent vertebral bodies to the graft; (3) prolonged use of antibiotics.

Although stainless steel (Senning, Weber, and Yasargil, 1962) or acrylic (Scoville, Palmer, Samra, and Chong, 1967) may theoretically be more suitable graft materials in the presence of infection, we elected to do the interbody fusion with an autogenous bone graft because it is less likely to act as an inert foreign body.

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