HORIZONTAL PELVIC OSTEOTOMIES
FOR BLADDER EXSTROPHY

A PRELIMINARY REPORT

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We have treated 11 patients aged three days to 15 years with bladder exstrophy by horizontal osteotomies of the innominate bones. The operation was originally used for older patients with severe deformity or failed previous surgery but is now applied as a primary procedure in the first week of life.

The osteotomies enable the complex malformations to be corrected in a single operation without turning the patient: the pubic bones can be brought together, the abdominal wall repaired and the bladder closed with reconstruction of the urethra and external genitalia.

The early results have been very satisfactory in all cases with only minor complications; we felt that a preliminary report should be made, despite a mean follow-up of only seven months.

Bladder exstrophy occurs in 1 in 30 000 to 50 000 live births; boys are affected two to five times more often than girls (O'Phelan 1963; Engel and Wilkinson 1970). There is failure of midline union of the abdominal wall muscles, bladder, urethra and pelvic ring. This exposes the lower urinary tract on the surface of the lower abdomen, between the diverging recti abdominis. The innominate bones are rotated laterally on the sacrum, so that the pubic bones form prominences in the groins, lateral to the bladder (Fig. 1). When untreated, there is urinary incontinence, and recurrent urinary tract infections may lead to renal failure (Boyce 1972). The exposed mucosa of the bladder may become metaplastic, and malignant change is possible (Engel and Wilkinson 1970).

These patients have relatively few orthopaedic problems, though there is an association with hip dysplasia (Thomas and Wilkinson 1989) and with spinal anomalies (Aadalen et al 1980). Affected children have a characteristic waddling gait, with femoral neck retroversion, and out-toeing. The acetabula are directed posterolaterally (Lloyd-Roberts, Williams and Braddock 1959).

The aim of treatment is to close the abdominal wall and achieve continence, with reconstruction of the external genitalia. Many techniques have been used, including cystectomy and urinary diversion (Bennett 1973), and bladder closure with or without additional bone surgery (Husmann, McLorie and Churchill 1989). To facilitate bladder reconstruction most surgeons have used bilateral posterior iliac osteotomies (Shultz 1958; Lloyd-Roberts et al 1959), though anterior pubic osteotomies have also been described (Cook, Leslie and Brannon 1962; Frey and Cohen 1989). Some of these procedures involve up to three operations (Mollard 1980).

The osteotomy we describe was originally devised to allow anterior approximation of the pubic bones and soft tissues in a one-stage procedure for patients in whom previous surgery had failed, or who were unsuitable for other osteotomies.

PATIENTS AND METHODS

Eleven patients aged from three days to 15 years (mean three years eight months) underwent the procedure. Five had prior surgery; two of them had had posterior pelvic osteotomies. One patient was considered by the referring specialist to have an incorrectable defect.

Operative technique. Under general anaesthesia, with the
patient supine, an incision is made along the iliac crest, passing distally on to the anterior surface of the thigh. The gap between the tensor fascia lata and sartorius is developed, and the origin of rectus femoris identified.

The cartilage of the iliac apophysis is split, gauze swabs are packed about the ilium and the sciatic notch is exposed subperiosteally. A Salter-type osteotomy is then performed, dividing the innominate bone in a straight horizontal line from the sciatic notch to just above the anterior inferior iliac spine. A large bone cutter is used in younger patients, and a Gigli saw in older children.

The distal fragments are then rotated medially, so that the pubic bones approach the midline. This differs from the classical Salter osteotomy for congenital dysplasia of the hip, where the rotation is laterally and inferiorly.

A wedge of bone is taken from the anterior superior iliac spine, as in the Salter osteotomy. This facilitates inward rotation of the distal fragment and wound closure (Fig. 2). In some cases, the wedge was used to prevent the distal fragment rotating laterally by inserting it in a lateral to medial fashion, with the base facing laterally.

In our first patient, we used Kirschner wires to stabilise the osteotomy, but subsequently found that leaving the osteotomy mobile facilitated bladder reconstruction.

After bladder reconstruction, the position of the bony pelvis is maintained by a Batchelor-type plaster with the legs in abduction and internal rotation, which is retained for four to six weeks.

RESULTS
Satisfactory bladder closure was achieved in all patients. In this preliminary report, follow-up is short with a median of 6.8 months and a mean of 7.3 ± 4.2 months.
Two patients had minor abdominal wound infections, which were treated with antibiotics and healed uneventfully. No patient had a bone infection.

One patient had urinary tract infection which was treated with antibiotics, and one developed urinary retention which required suprapubic catheterisation for three days after operation.

All patients had sound union of their osteotomies, and with no need for further bone operations.

DISCUSSION

Posterior iliac osteotomy is a well recognised procedure for patients with bladder exstrophy, but does not always provide adequate and stable anterior closure of the pelvic ring (Husmann et al 1989).

Horizontal iliac osteotomies do not require that the patient be turned; they also reduce tension on the soft tissues during bladder reconstruction. The operation produces a stable anterior pelvic ring which supports the bladder neck and facilitates reconstruction of the urethra and genitalia. The bone position can be held in plaster with no pins or external fixators; this reduces soft-tissue tension during healing.

Complete apposition of the pubis is rarely achieved, but it is very much easier to close the bladder than after posterior pelvic osteotomies, and our urological colleagues have been delighted.

The long-term effects on gait are not yet known, but those of our older patients who walk are pleased by the cosmetic improvement in their previously out-turned feet.

Our early experience with this procedure may encourage its wider application. It is quicker and allows for an easier, more stable and tension-free soft-tissue repair than other techniques.

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REFERENCES


