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## Indications

- Acetabular dysplasia with point loading, lateral migration, and painful limp.
- Hip joint should be reasonably congruent in abduction and internal rotation.

## Preoperative Planning

### Clinical Assessment

- May have a short leg on the ipsilateral side.
- Trendelenburg positive.
- Painful hip, thigh, or knee.
- Confirm females are not on contraceptive pill for 4 weeks before surgery.

### Radiological Assessment

- AP pelvis standing.
- AP pelvis with hips abducted and internal rotation.
- CT 3D reconstruction to determine where acetabulum is deficient (Fig. 2.1).
- CT through femoral neck and femoral condyles to determine femoral neck anteversion compared to the opposite side.



**Fig. 2.1** CT 3D reconstruction presenting the hip dysplasia

- Use information to judge
  - Amount of femoral head coverage required.
  - Amount of femoral neck anteversion and size of AO 90° blade plate if femoral neck osteotomy is required.

## Operative Treatment

### Anesthesia

- General anesthesia plus epidural or regional triple block.
- Prophylactic intravenous antibiotics administered at the time of induction.

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**Fig. 2.2** Surgical tray with the respective tools



### Equipment (Fig. 2.2)

- Periosteal elevators.
- Lahey clamps.
- Osteotomes and mallet.
- Nibblers.
- Rang retractors.
- Gigli saw.
- Bone-holding forceps.
- Laminar spreaders.
- Travers self-retaining retractors.
- Cannulated screws that are 6.5 mm in diameter. Using a cannulated screw that requires a 3.2-mm-diameter guide wire makes accurate placement much easier.
- Image intensifier.

### Table Set Up

- Radiolucent table allowing unobstructed AP view of the pelvis. Consider extension for standard table or OSI table (Fig. 2.3a).

### Patient Positioning

- Patient supine, sandbag, or “jelly” under lumbar region of affected side.

- Check that it is possible to perform AP view of pelvis with image intensifier (Fig. 2.3b).

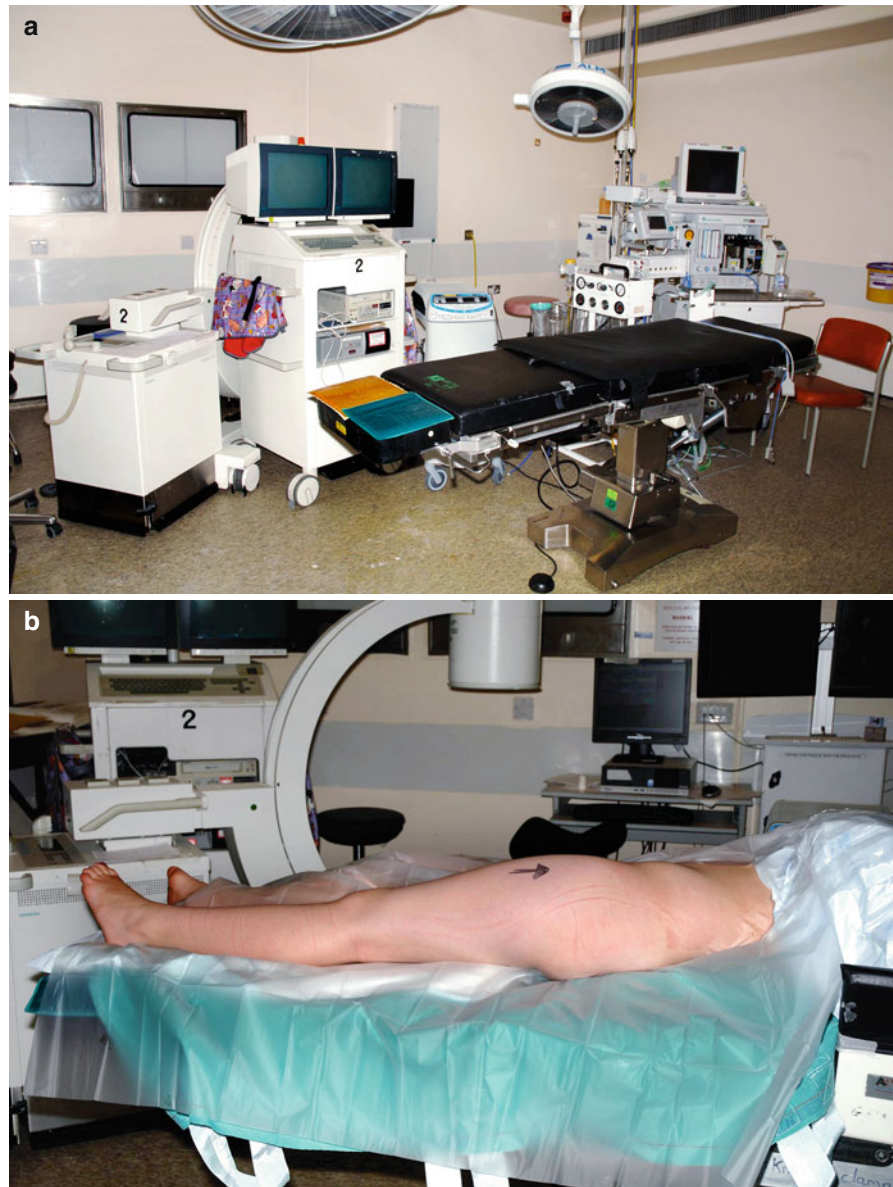
### Draping

- Place a “U-shaped” isolation drape before preparing the skin with aqueous betadine or chlorhexidine. Make sure ischium is exposed.
- Then drape as per hip operation leaving thigh, buttock, and iliac crest freely accessible.
- Use a waterproof “sock” for the leg up to the knee.

### Incision

- *Transverse incision* in gluteal fold of buttock. With hip flexed and knee both flexed to 90° in neutral rotation and abduction, expose ischial tuberosity. Reflect gluteus maximus laterally. Hamstrings are attached to the ischial tuberosity. Sciatic nerve is situated lateral to semimembranosus. Clear tendon attachments from site of osteotomy and place Lahey clamps on each side of ischium to protect the pudendal nerve and vessels in obturator foramen (Fig. 2.4).
- *Anterior oblique incision* centered on a point 2 cm distal to the anterior superior iliac spine. Explore the interval between sartorius and tensor fascia

**Fig. 2.3** (a) Radiolucent table allowing unobstructed AP view of the pelvis. (b) Patient positioning and marked leg



lata muscles, protecting the lateral cutaneous nerve of the thigh which should be retracted medially. Conjoint tendon of rectus does not need to be reflected if joint capsule is not going to be opened. In immature patients, split iliac crest with knife from anterior superior iliac spine backwards to the middle third of the crest at least. Reflect crest medially and laterally using a broad periosteal elevator down to greater sciatic notch. Keeping close to medial and lateral cortices of ilium, aim 45° distally and not vertically downwards for fear

of injuring superior gluteal vessel and sciatic nerve. Pack with a swap on each side (Fig. 2.5).

## Procedure

- *Ischial osteotomy.* Isolate ischium and protect contents of obturator foramen. Use osteotome to divide ischium from lateral to medial. Consider using nibblers to broaden the osteotomy to ensure ease of displacement (Fig. 2.6).



- **Superior pubic osteotomy.** Via the anterior oblique approach, the pubis is exposed subperiosteally. Flexing and adducting the hip will make this exposure easier. I release psoas at the brim by performing an intramuscular tenotomy to reduce tension in the psoas. Again the pubis is isolated using Lahey clamps, one superior and one inferior to ensure that the osteotomy is performed in the correct place and not intra-articularly. Curved osteotomes are used to complete the osteotomy under image intensifier control (Fig. 2.7a, b).
- **Salter pelvic osteotomy.** A routine Salter osteotomy is performed from the greater sciatic notch to the anterior inferior iliac spine or 0.5 cm above it to allow crossed cannulated screws if necessary. The contents of the greater sciatic notch are protected with Rang retractors, and a Gigli saw is passed from medial to lateral using the curved Lahey clamps. The Rang retractors should be positioned perpendicular to the plane of the ilium. While the Gigli saw is being used, it is important to keep one's hands as far apart as possible to prevent the saw "binding" in the middle of the manoeuvre. Once complete, the anterior third of the iliac crest is harvested with an oscillating saw to be used as a graft. It may as well need to be fashioned into a 25° wedge with the saw. The iliac osteotomy is opened to provide improved anterior and lateral coverage by placing the lower limb in a "figure of 4" position and pulling the distal iliac fragment forward and inferiorly with a bone-holding forceps and a laminar spreader. It is essential not to allow the distal fragment to drop backwards, and the posterior edges of the iliac osteotomy must be touching at the greater sciatic notch to prevent injury to the sciatic nerve and to prevent overlengthening of the lower limb. The graft is inserted and then held with two guide wires under image intensifier control (Fig. 2.8a–c).



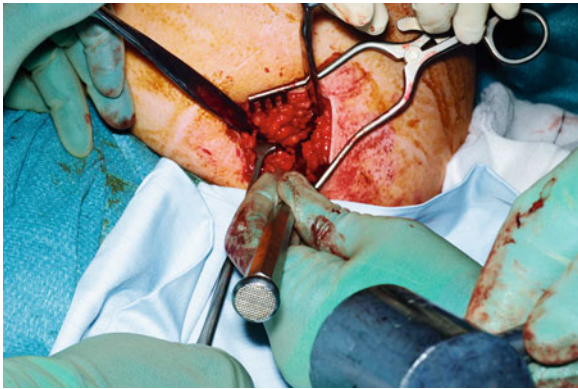
**Fig. 2.4** Transverse incision marked

### Implant Positioning

- Either 2 proximal to distal 6.5-mm cannulated screws or a crossed configuration can be used to give the



**Fig. 2.5** Anterior oblique incision marked



**Fig. 2.6** Ischial osteotomy with the osteotome

most stable fixation. One can expect a  $15^\circ$  improvement in the center-edge angle (Figs. 2.9a, b and 2.10).

- If the coverage obtained is not sufficient then consider a femoral osteotomy as well (Fig. 2.11).

### Closure

- Wash with saline.
- Close ischial wound at time of procedure.
- Anterior wound requires iliac crest to be brought together with towel clips and then sutured with 1.0 Vicryl interrupted sutures.
- External oblique and fascia closed with 2.0 Vicryl taking care not to trap lateral cutaneous nerve of the thigh. Fat closed with 2.0 Vicryl and 3.0 Vicryl subcuticular for skin (Fig. 2.12).

### Postoperative Rehabilitation

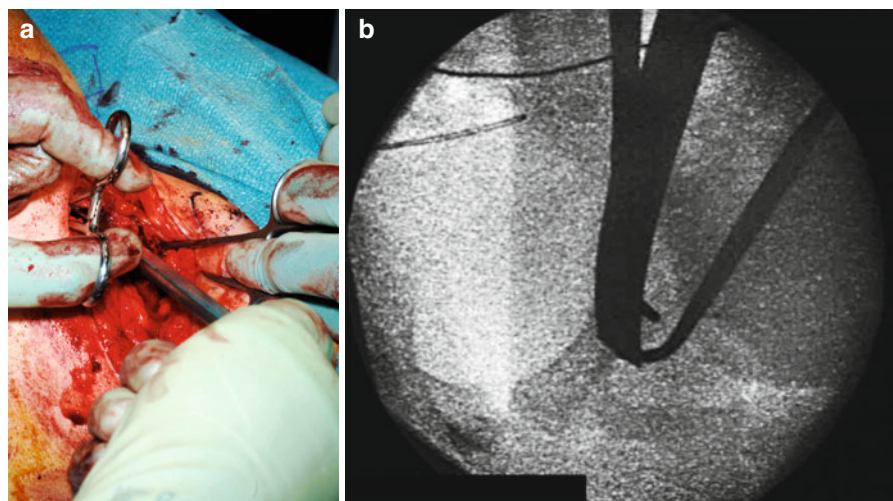
- I do not use a spica in adolescents or adults.
- An epidural for 48 h postop provides excellent pain relief.
- Mobilize once comfortable after removal of epidural.
- Start mechanical VTE prophylaxis at admission and continue until the patient no longer has significantly reduced mobility based on an assessment of risks. Start pharmacological VTE prophylaxis after surgery and continue until the patient no longer has significantly reduced mobility.
- Toe-touch weight-bearing for 6 weeks then partial weight-bearing for another 6 weeks.
- Encourage a range of movement exercises after osteotomies have united, 6–8 weeks after surgery.
- If satisfactory at 12 weeks, consider full weight-bearing.

### Outpatient Follow-Up

- Review wounds by district nurse or practice nurse at 2 weeks.
- Review in the clinic at 6 weeks for an AP pelvic X-ray and then at 12 weeks (Fig. 2.13).

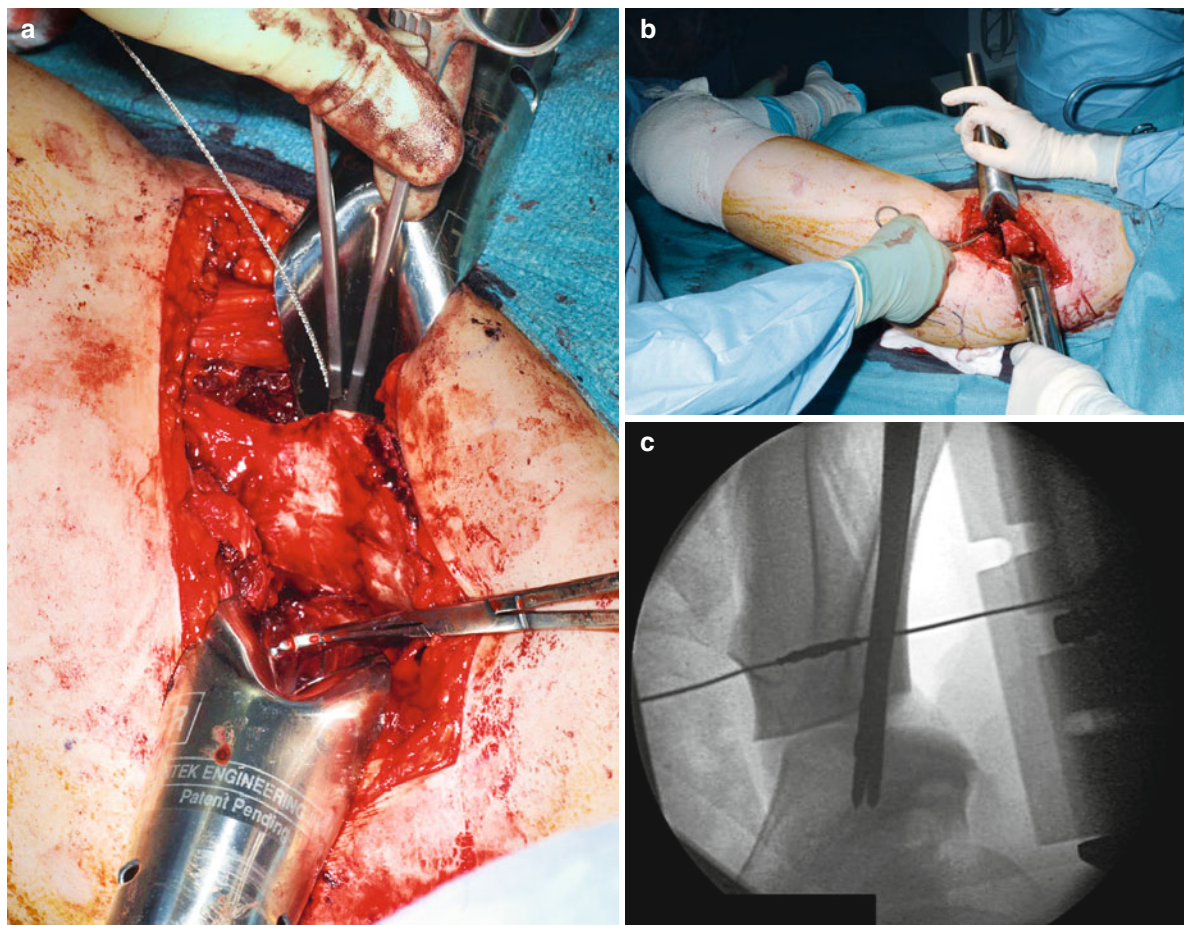
### Implant Removal

- I leave the cannulated screws in situ unless they will cause a problem with future total hip replacement.

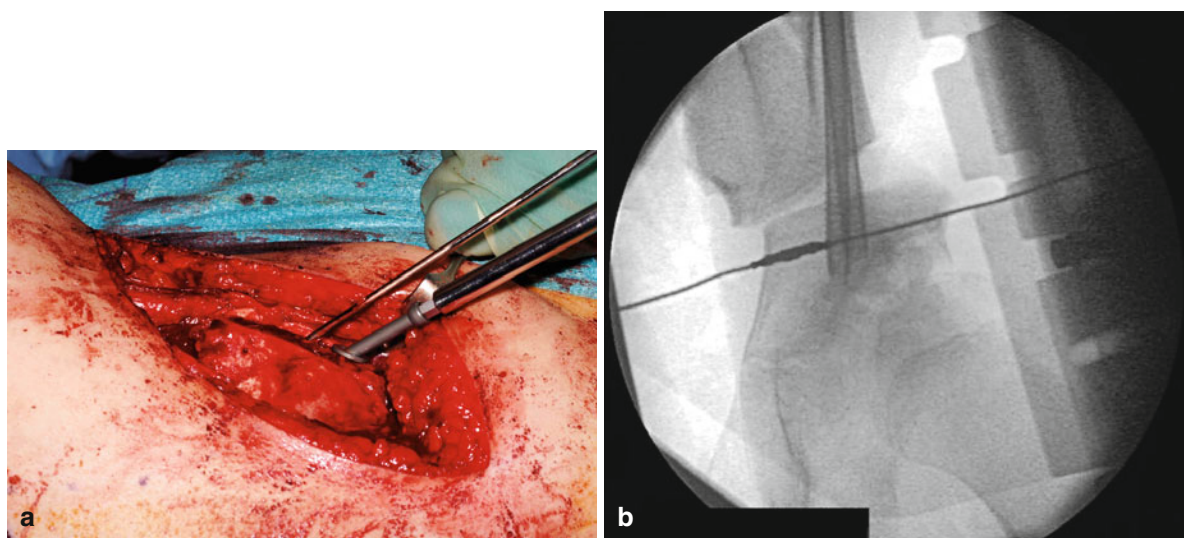


**Fig. 2.7** (a) Superior pubic osteotomy. (b) Superior pubic osteotomy performed under image intensifier





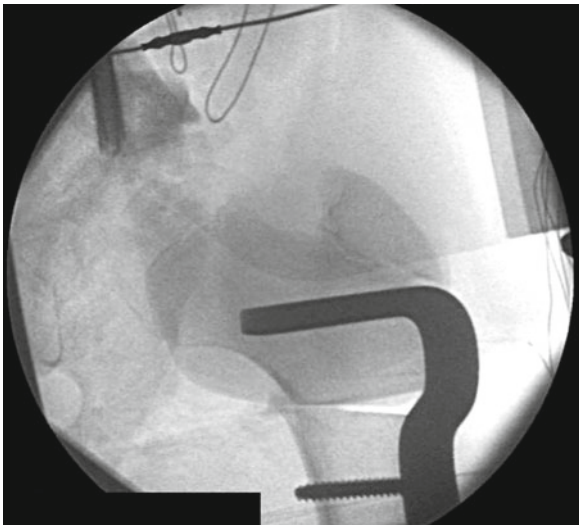
**Fig. 2.8** (a, b) Salter pelvic osteotomy. (c) Salter pelvic osteotomy performed under image intensifier



**Fig. 2.9** (a) Implant/screw positioning. (b) Implant/screw positioning under image intensifier



**Fig. 2.10** Postoperative X-ray



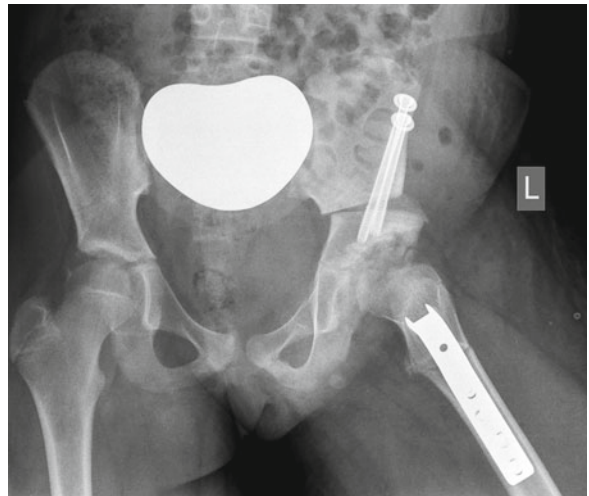
**Fig. 2.11** Femoral osteotomy if it necessary

## Further Reading

Vukasinovic Z, Pelillo F, Spasovski D, et al. Triple pelvic osteotomy for the treatment of residual hip dysplasia. Analysis of complications. *Hip Int.* 2009;19(4):315–22.



**Fig. 2.12** Skin closure



**Fig. 2.13** X-rays are necessary during the follow-up period

Santore RF, Turgeon TR, Phillips 3rd WF, et al. Pelvic and femoral osteotomy in the treatment of hip disease in the young adult. *Instr Course Lect.* 2006;55:131–44.

Gillingham BL, Sanchez AA, Wenger DR, et al. Pelvic osteotomies for the treatment of hip dysplasia in children and young adults. *J Am Acad Orthop Surg.* 1999;7(5):325–37.

De Kleuver M, Kooijman MA, Pavlov PW, et al. Triple osteotomy of the pelvis for acetabular dysplasia: results at 8 to 15 years. *J Bone Joint Surg Br.* 1997;79(2):225–9.

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