

Periacetabular osteotomy for dysplastic hip joint – experiences in Helsinki

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The Bernese rotational acetabular osteotomy (RAO) was developed in 1983 (1) in order to prevent the development of arthrosis in young patients with hip dysplasia, and several reports on satisfactory results have subsequently been published (2–9). The RAO performed through the two most frequently used approaches, the ilioinguinal and Smith-Petersen, requires a broad dissection of the pelvic bones and detaching of muscle insertions (10).

A less invasive method which was developed initially for pelvic and acetabular fractures was modified for rotational acetabular osteotomy in 1994 at our department. This two-incision anterior technique includes both an extraperitoneal and an anterolateral exposure (ilioanterior approach) of the pelvic bones allowing an unconstrained approach to the medial acetabular wall leaving the lateral true acetabular area untouchable (11).

Patients and methods

In the first series a total of 33 patients with hip dysplasia (35 hips) were treated operatively at our department from December 1994 to December 1999. Indication for the operation was a painful dysplastic hip with a CE angle less than 20 degrees. This patient group was analysed and the first follow-up results were encouraging (12).

After this first group of patients there were additional 47 patients operated on by December 2006.

Osteotomy was accomplished from the inner side of the pelvis using the ilioanterior approach. Stabilisation of the osteotomy was secured with 2 plates and full range motion of the hip was allowed within 2 days postoperatively, while weight-bearing was limited for a minimum of 6 weeks. Full weight-bearing was the-

reafter allowed individually according to the clinical status and union of osteotomy.

Results

The operation time of the first 35 operations averaged 145 (100–215) minutes, and the mean blood loss 1660 (600–5000) ml. The operative blood loss was substituted in average with 6 (2–13) units of red blood cells (400cc per unit). Patients were discharged from the hospital in average 7 (4–12) days postoperatively. The first postoperative control was at 6 weeks, and patients were followed until complete healing was observed and in the final follow-up visit.

The complications and technical results were reviewed in 27 patients (28 hips) after a minimum follow-up of 1 year (mean 33 months, SD 15). No major operative complications were observed, but dysfunction of lateral femoral cutaneous nerve was frequent (14 patients). One patient had a temporary postoperative palsy of femoral nerve, which resolved within a few days. No major bleedings or deep vein thrombosis were observed. One patient had a minor toxic reaction to the infused red blood cells during the first postoperative day. There was one intra-articular osteotomy (penetration of the chisel in the acetabular roof), but no iatrogenic fractures of the acetabulum. Two patients had a hardware failure (broken screws), which caused a minor displacement towards the original position of the osteotomised component. Subsequently, screw fixation has been abandoned and only plate-fixations have been used since January 1998. Two patients have had their screws removed due to pain.

In the later group of 47 patients, there were two patients having a non-union and one patient with a delayed union of the ischial bone. Five patients of the

total of 80 patients showed a worsening osteoarthritis leading to total hip replacement.

27 of the 33 patients attended the final follow-up examination (Table 1), with an average follow-up of 33 (12–61) months. Seven of the 27 patients had slightly decreased strength of the quadriceps muscle, and 14 had some atrophy of the thigh (decreased circumference in average 2.4 cm, SD 1.7, range 0 to 6, compared to the other leg).

Average range of motion of the operated hip at the latest follow-up did not differ significantly from that observed preoperatively. The mean Merle D'Aubigne score increased from a pre-operative value of 13.5 (7–17) to 15.2 (11–18) at the latest control in those 20 patients with a follow-up of at least 2 years. The most important factor contributing to the increase in total score was the improvement of pain score, which increased from a preoperative mean 3.9 (3.0–5.0) to 5.1 (3.0–6.0). The mean Harris hip score of this subgroup increased from 52 (24–80) to 78 (27–100). The mean preoperative and follow-up acetabular indexes and CE angles of Wiberg are presented in Table 1.

Heterotopic ossification or osteonecrosis of the osteotomised component was not observed in any of the patients during follow-up.

Discussion

The long-term results of 63 patients who had had Bernese rotational acetabular osteotomy due to acetabular dysplasia (1) have been published recently (3,13). The average operation time, when using a Smith-Petersen approach, was 3.5 hours, with a mean blood loss of 2000 ml. Most of the other studies of RAO perfor-

med through the same approach have reported similar averages of operation time and blood loss. Moreover, the other of the most frequently used approaches, the ilioinguinal, seems to be even more time consuming (14). The mean total operation time in our series was 2.5 hours, indicating that the dual approach technique used in this series may shorten the operation time, possibly due to advantageous visualisation of the periacetabular area. This enables the osteotomy to be performed under direct visual control, in contrast to the partly blind procedure when using the Smith-Petersen approach. Our technique also reduces the need of fluoroscopy, which may further reduce the operation time.

The dual approach method we used does not compromise the pelvic muscle insertions, allowing early full range motion exercise of the hip. A restriction of six weeks in hip musculature exercises, which is recommended when using the Smith-Petersen approach due to muscle insertion detaching, may decrease the strength and postoperative range of motion of the hip (3). In the present series, full range motion exercises were started early, and no difference was observed between the average range of motion of the operated hip pre- and postoperatively. However, the delayed union or non-union seen in some patients in the present series with an early active mobilisation of the joint and start of weight-bearing at 6 weeks suggest that the most active rehabilitation should not be started too early.

The rate of serious and major complications in RAO, when using the Smith-Petersen approach, is low (15) as seen also in the present study. However, a high incidence (22–30 %) of lateral femoral cutaneous ner-

Table 1. Range of motion and radiographic measures of the operated hip preoperatively and at latest follow-up of 27 patients.

	Preoperative			At latest follow-up			Difference
	Mean	SD	Range	Mean	SD	Range	Mean
Flexion	123	16	90–140	118	20	80–140	5
Abduction	32	14	0–45	40	8	20–45	-8
Adduction	26	8	0–30	28	5	10–30	-2
Internal rotation	23	13	0–40	32	12	0–40	-9
External rotation	28	15	0–45	33	13	10–45	-5
CE angle of Wiberg	11	9	-20–21	35	11	13–59	24
Acetabular index	20	8	8–35	12	7	-10–24	8

ve dysfunction has been reported in association with both the Smith-Petersen and ilioinguinal approaches (16). The high rate of this minor complication in our series further corroborates those earlier findings, and this possibility should always be informed preoperatively to the patients. This neural dysfunction cannot always be avoidable, regardless of tender managing during the operation or the approach used.

Patients with radiological signs of osteoarthritis have to be notified of the risk of progression of the disease, especially if they are over 50 years of age.

In conclusion, the technique described in the present study can be used in connection with osteotomies, and it is used as a customary method at our department in pelvic and acetabular fractures. Apart from the relatively high incidence of lateral femoral cutaneous nerve dysfunction and blood loss, the complication rate associated with this method seems to be low. However, the technique is demanding and good surgical skills in pelvic surgery are needed. The operation is always a major surgical procedure for the patient and a prolonged rehabilitation time for at least three months is needed. Therefore a good patient selection is important. The operation should be concentrated to younger patients with symptomatic hips with clear dysplasia. This operation cannot be generally recommended for patients near the age of 50 years showing already clear signs of osteoarthritis.

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