The Stolzalpe technique: a modified Watson-Jones approach

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Abstract We report our experiences with minimally invasive total hip replacement performed via a modified Watson-Jones approach with a special positioning technique (the “Stolzalpe technique”). With the patient placed in the conventional supine position, the contralateral leg is held in a gynaecological footrest to allow hyperextension, adduction and external rotation of the leg during femoral preparation. The first 117 patients operated with this technique were compared with a conventionally operated group. The patients operated with the Stolzalpe technique had superior results for nearly all study criteria, including time of operation, time of postoperative intensive care, blood loss, complications and Harris Hip Score. The Stolzalpe technique appears to be the best possible compromise between patient comfort and the surgical demands of proper implant positioning, minimization of anaesthetic risk, and reducing the time required for draping and positioning.

Introduction

Despite the trend toward minimally invasive total hip replacement (THR) [1, 2], there are still controversies with regards to the selection of surgical approach, patient positioning, and surgical instrumentation [3]. Nonetheless, it is generally accepted that it is not the length of the skin incision that determines the success of these procedures, but the sparing of the muscle and ligamentous structures [4].

Proper patient positioning is essential if the surgeon is to achieve optimal placement of the femoral stem and acetabular cup during THR. Generally, the supine position is preferred by surgeons, particularly in training hospitals and even when navigation systems are employed. Anaesthetists also prefer the conventional supine patient position, due to the possible need for emergency intubation during regional anaesthesia. The supine position also markedly reduces the time required for draping the patient, as the contralateral leg does not have to be prepared and draped to allow movement. For these reasons, we have developed a minimally invasive technique for performing THR in the supine position using a modified Watson-Jones antero-lateral approach [5–7], referred to herein as the Stolzalpe technique.

This study was designed to determine the advantages and disadvantages of using the Stolzalpe technique when performing THR using a minimally invasive approach by comparing the cases of patients operated using this technique with those of conventionally operated patients.

Materials and methods

Patient positioning and operative technique

The patient is placed in a conventional supine position with the contralateral leg positioned on a gynaecological footrest (Fig. 1). Flexion of 30 degrees is usually sufficient to allow the operative leg to be adducted underneath the contralateral leg during preparation of the femur. Sterile preparation and draping of the operative leg is carried out and the contralateral leg is draped with a sack-shaped towel (Fig. 2).

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Fig. 1 Patient positioning in the supine position with the contralateral leg on a gynaecological footrest

We prefer a modified Watson-Jones anterolateral approach with a slightly curved skin incision commencing 3–4 cm lateral to the anterior superior iliac spine and continuing as far as the base of the greater trochanter. After splitting the fascia lata, the region of the gap between the anterior margin of the gluteus medius and the tensor fasciae latae is entered. The joint capsule is exposed and then split, with the individual surgeon dictating whether or not the joint capsule is preserved or resected according to their preferred technique. After resection of the femoral neck and removal of the head of the femur, the acetabulum is exposed with retractors. We prefer using a Langenbeck hook to a retractor for exposing the anterior margin of the acetabulum in order to prevent pressure-induced femoral

Fig. 2 Completed draping before the start of the operation; the leg plate under the contralateral leg has already been removed

nerve paresis. Preparation and insertion of the cup are performed in the usual way. Offset reaming and impacting instruments are of benefit, but are not absolutely essential.

Preparation of the femur

During preparation of the femur, the movable leg plate on the operating table is folded down and the leg is hyperextended (Fig. 3). The gluteus medius is pushed dorsally with the curved Hohmann retractor inserted between the greater trochanter and the gluteal muscles. Through adduction and external rotation, the site of femoral neck resection becomes clearly visible in the operative field (Fig. 3).

The femur is prepared through the standard approach, followed by insertion of the prosthetic component and selection of the appropriate neck length after trial reduction. Next, the wound is closed using commonly accepted methods. We recommend placement of vacuum drains subfascially or, in obese patients, subcutaneously.

The postoperative treatment essentially does not differ from that of other minimally operated hip patients [7]: mobilisation with forearm crutches takes place on the 1st postoperative day, with four-point walking and full loading depending on the capabilities of the individual patient. The use of crutches is recommended until outpatient review after 6 weeks, but can be dispensed with sooner depending on the individual patient's assessment.

Clinical series

From September 2004 to September 2006, we performed THRs in 640 patients using the minimally invasive

Fig. 3 Position of the leg in hyperextension with the leg plate folded down. Adduction and external rotation under the contralateral leg. The femoral neck resection site for preparation of the femur is clearly visible

Stolzalpe technique. The first 117 patients were compared with 124 patients operated with the conventional method from January 2004 to April 2004 (Table 1). Patients participating in this prospective analysis were randomised to either arm and the following data were collected: average age, number of orthopaedic surgeons, time of operation, complications, patient's weight, time in the postoperative intensive ward, length of skin incision, and blood loss. The Harris Hip Score was monitored preoperatively and postoperatively at 6 weeks, 3 months, and 6 months. Patients with previous operations, such as varus/valgus osteotomy or acetabulum plasty, were excluded from the study. Seven orthopaedic surgeons (two experienced, five in training) operated using the minimally invasive technique, and nine orthopaedic surgeons (five experienced, four in training) operated using the conventional technique.

Results

A comparison of the two patient groups indicated that those with minimally invasive surgery had superior results in nearly all the criteria examined (Table 1). The average operating time was reduced from 76 min (conventional) to 40 min using the minimally invasive technique; the postoperative time patients spent in the intensive care unit was reduced by 3 h; length of the skin incision was reduced from 18 cm to 7–10 cm; the average total blood loss was reduced by 226 ccm. Complications of the minimally invasive procedures included seven shaft fissures (3.1%), which all occurred in the first 3 months after introducing this technique to our colleagues in training. All shaft

Table 1 Comparison of the results of 117 patients operated with MIS with 124 patients operated with a conventional method

	117 patients MIS	124 patients conventional
Age average	63 years (29–90 a)	63.6 years (33–84 a)
Orthopaedic surgeons	7 (2 experienced/5 in training)	9 (3 experienced/6 in training)
OP duration	40 min (35–53 experienced)	76 min (55–102)
Fissures	7	0
Weight	85 (55–120) kg	82 (52–118) kg
Hours p.o. ward	7 h (1.5–24)	9 h (1.2–44)
Length of incision	7–10 cm	18 cm
Blood loss	719 ml (250–2,400)	945 ml (300–3,500)
P.o. luxation	1	1

The shaft fractures occurred within the first 3 months after introduction of the new technique

Fig. 4 Postoperative assessment according to the Harris Hip Score. Patients operated with MIS compared to conventionally operated patients showed better results at every follow-up examination

fissures were minimal and were observed immediately at the time of operation. The shaft fissures were adequately treated with only one cerclage and did not have a clinically significant impact on postoperative care or final outcome. Revision surgery during follow-up was unnecessary in both groups. No fractures of the greater trochanter were recorded. Luxation occurred in one patient in each group and was caused by improper cup positioning (conventional group) and significant hyperactivity 2 days after operation (minimally invasive group). Radiographic analysis indicated correct inclination and anteversion in all cases in both groups (excluding the one luxation in the conventional group). One undersized stem with varus position was observed in the minimally invasive group, but after 3 months follow-up even this stem was fully osteointegrated. Leg length was measured pre-, intra-, and postoperatively. No discrepancies in leg length of >5 mm were observed. A comparison of Harris Hip Scores between the groups found that patients operated with the minimally invasive technique had better results in every phase of the follow-up. Postoperative improvement at the 6-week review also favoured the minimally invasive hip replacement group (Fig. 4), with the majority of benefit occurring at 6 weeks postoperatively. After 6 postoperative months there was no significant difference in the Harris Hip Score between the minimally invasive and conventionally operated patients.

Blood loss was on average 226 ccm less in the MIS group. Eight haematomas were observed, which were treated with simple compression not requiring revisions.

Discussion

The potential advantages of MIS hip arthroplasty are beyond any doubt and can possibly be enhanced through

the use of the Stolz technique. The proposed benefits and disadvantages of this new technique are as follows:

- Benefits
 - Because of the supine position, even orthopaedic surgeons in training can position the implants (e.g., cup position) with little difficulty
 - The position is comfortable for the patient
 - Lack of problems during an anaesthetic emergency requiring a change from lumbar anaesthesia to intubation
 - Shorter time for draping
 - After refinement of this technique, even an arthrodesis of the other hip joint failed to be a contraindication to using this technique
- Disadvantages
 - The need for an operating table with two separate leg plates that can be removed as needed, as well as a gynaecologic footrest for positioning of the non-operated leg

Our positioning technique appears to offer the greatest compromise with regards to implant positioning, anaesthesia, time spent draping, and patient comfort. During positioning, it is important to ensure that the patient is not placed too proximally on the operation table, as otherwise the leg cannot be hyperextended sufficiently by folding down the leg plate. It is also important to make certain that patients achieve satisfactory muscle relaxation during hyperextension of the leg with subsequent adduction under the contralateral leg and external rotation. Abrupt manoeuvres increase the risk of femoral fissure. No further femoral fissures occurred after the initial phase when patients brought the leg slowly into the definitive operation position (hyperextension, adduction, external rotation) and achieved adequate muscle relaxation.

Particular attention must also be given to haemostasis. Given the reduced operative fields associated with minimally invasive techniques, the use of retractors and hooks can cause increased compression of the capsular vessels. Bleeding vessels can be easily overlooked and result in an

increased risk of postoperative secondary haemorrhage. To reduce the risk of haematomas, we recommend 12 h of postoperative wound compression.

In our experience, the learning curve for the operation team is markedly shortened when the patient is placed in the supine position. The technique even proved to be of value in a training hospital setting where many of the surgeons were less experienced. No complications (i.e., femur fissures and luxation) were observed after the first 3 months after introducing this technique. Should intra-operative problems occur, one can easily switch over to a conventional operative technique. As operating tables with folding leg plates are standard in most hospitals, the only modification needed to perform the Stolz positioning technique is the addition of a gynaecological footrest.

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