Ischiofemoral hip ligament reconstructions for recurrent posterior total hip joint dislocations

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ABSTRACT

Objective: Recurrent dislocations of a total hip joint replacement are a difficult

problem to address. We present a technique for reconstructing the ischiofemoral ligament of the hip to prevent recurrent posterior dislocations.

Methods: This is a case series of 5 patients with a reconstruction performed using either a bone-patellar tendon-bone graft autograft or allograft.

Results: At an average follow up of 47 months following the reconstruction, there were no redislocations.

Conclusion: Ischiofemoral hip ligament reconstruction is a viable technique in addressing recurrent dislocations of total hip joint replacements.

1. Introduction

Recurrent dislocations of a total hip joint replacement are a problematic and frustrating complication for both the surgeon and patient. For a primary total hip joint replacement, the reported incidence varies widely from less than 1%–7%.¹

The risk is not static and increases with advancing age of the implant.

The causes of dislocation can be broadly divided into patient related, implant related or surgery related factors. Rarely, in an optimally placed implant with no identifiable risk factors for dislocation, recurrent instability and dislocation occurs. In these cases, the results of revision surgery can sometimes be disappointing and the instability persists.

Some surgeons have reported a soft tissue void posteriorly during revision surgery for recurrent dislocation.² This deficiency, represented by a lack of soft tissue, removes a barrier for excessive internal rotation of the hip and causes the creation of a 'pocket' for the hip to dislocate into, making the management of this problem frustrating.

We present a technique for reconstructing the ischiofemoral ligament of the hip to prevent recurrent posterior dislocations of total hip joint replacements. The graft used is either bone-patella tendon-bone autograft or allograft. This technique serves to install a barrier against dislocation, to provide a tissue scaffold for the formation of a pseudo-capsule of scar tissue and to provide a physical restraint against excessive internal rotation.

2. Method

Auckland City Hospital Institutional board review (A + 4966) and ethics approval from the Health and Disability Ethics Committees (NTX/10/EXP/226) was obtained. A search and review was undertaken of all the cases that underwent an ischiofemoral hip ligament (IFHL) reconstruction.

The patient's records were accessed first and the relevant information was extracted. In the case of a deceased patient, the patient's general practitioner or family was contacted to obtain more information. Living patients were contacted directly by telephone.

Details of the primary hip replacement including date of surgery, implants used and complications were recorded. The date and mechanism of the first dislocation, number of subsequent dislocations and surgical interventions prior to the ligament reconstruction was obtained. Next, details of the IFHL reconstruction was determined. The date of surgery, type of ligament used, stability pre and post reconstruction, revision of components, implants used and details of post operative bracing were recorded.

The patient's were asked about the current mobility status and if they have had any further dislocations or problems with the hip. Any gaps in the past history were also filled. If a concern was raised that needed further review, an appropriate follow up plan was devised.

3. Operative technique

The patient is initially placed supine if an autologous bone-patella tendon-bone graft is to be harvested. This is done through a midline

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incision over the knee, harvesting the central third portion of the patella tendon as a graft, using the same technique as one would for harvesting a graft for and anterior cruciate ligament reconstruction.

The patient is then placed in the lateral decubitus position. After routine skin preparation and application of standard hip drapes, the previous surgical incision is identified. In our study, all the patients had their primary procedure done through a posterior approach and this incision was re-used. The fascia lata is incised and the sciatic nerve identified and protected. The tissues are assessed making special note of the presence of a 'pocket' or a thin, non-structural pseudocapsule posteriorly.

The stability of the hip, sources of impingement, condition and alignment of the components are then assessed. Scar tissue is resected as appropriate to gain access and visualise the implants. At this stage, revision of components is then undertaken if needed.

Following this, the ischiofemoral ligament is reconstructed. After preparation of the graft, with the hip dislocated, a 10 mm bone tunnel is drilled in the trochanteric fossa at the insertion site of the piriformis tendon. Then, the posterior margin of the acetabulum, at the region of the middle third is cleared of soft tissue. The distal end of the graft is secured in the bone tunnel using a 7 mm RCI screw (Smith and Nephew, Andover, MA) of appropriate length.

The hip is then placed in 90 degrees of flexion and the proximal end of the graft secured using a Richard's Bone Staple (Smith and Nephew, Andover, MA.). Fig. 1 illustrates how the graft is fixed. Care is taken to affix the proximal end of the graft at the same level as the greater

Fig. 1. Illustration depicting the position of the graft.

Fig. 2. Post operative radiograph of a patient following an ischiofemoral hip ligament reconstruction.

trochanter. A point more superior than this will serve to limit flexion as opposed to internal rotation. A point more inferior than this will not provide support.

The stability of the hip is then reassessed. After closure of the wounds, a post operative radiograph (Fig. 2) is taken in recovery. The patient is allowed to mobilise immediately, weight bearing as tolerated. Once standing, the patient placed in a hinged abduction brace for a period of 6–12 weeks.

4. Results

A total of five patients were identified, four women and one men. Two patients had right and three patients had left total hip joint replacements. One patient had since died and contact was made with the patient's general practitioner for more information. In all other cases, the patient's were contacted directly. A summary of the results is provided in Table 1.

The mean followup period (defined as the time from IFHL reconstruction to date contact made or date of death) was 47 months (range, 4–100). The average age at reconstruction was 71.8 years (range, 69–74). The average time from the index hip joint replacement to IFHL reconstruction was 36.4 months (range, 4–89) and the average time to the first dislocation was 27.2 months (range, 1–72). The average time from the first dislocation to IFHL reconstruction was 9 months (range, 1–16).

The average number of dislocations prior to IFHL reconstruction was 3.6 times (range, 1–7). Only one patient was revised after a single dislocation, however this patient also had recurrent episodes of subluxation, where she felt the hip was unstable and almost dislocated.

The acetabular components used in four patients were the CLS Expansion (Zimmer, Warsaw, IN) cup with the matching CLS Polyethylene (Zimmer, Warsaw, IN) 28 mm liner. One patient had a cemented Contemporary cup (Stryker, Kalamazoo, MI). Three patients had an uncemented CLS Spotorno (Zimmer, Warsaw, IN) femoral stem and a cemented M.E. Müller (Zimmer, Warsaw, IN) stem was used in two patients.

No patients had a revision procedure or any other operative procedure on the hip prior to the ligament reconstruction apart from a closed reduction under general anaesthesia. Four patients had revision of the modular components during the IFHL reconstruction. No patients underwent a femoral stem revision. The acetabular component and liner was revised in three patients. The femoral head was exchanged in four patients, with three patients receiving a larger head size (all from 28 mm to 32 mm).

During the revision procedure, a deficiency in the soft tissues

Table 1
Summary of results.

Patient	Sex	Age at IFLR (years)	Time from index procedure to first dislocation (months)	Number of dislocations (subluxations) before IFLR	Revision of femoral stem at time of IFLR	Revision of Acetabulum at time of IFLR	Revision of head at time of IFLR	Revision of acetabular liner at time of IFLR	Increase in head size	Failure following IFLR	Follow-up (months)
A	F	74	61	1 (5)	No	No	Yes	Yes	Yes (32 mm)	No	6
B	F	73	1	4	No	Yes	Yes	Yes	Yes (32 mm)	No	4
C	F	70	1	2	No	Yes	Yes	N/A	No	No	100
D	M	73	1	7	No	Yes	Yes	Yes	Yes (32 mm)	No	45
E	F	69	72	4	No	No	No	No	No	No	80

posteriorly, represented by a pocket was specifically noted in all patients. This was closed off with the ligament reconstruction and soft tissue repair.

In three patients, the ligament was reconstructed using an ipsilateral bone-patellar tendon-bone autograft, and in the remaining two patients, the reconstruction was performed using a bone-patella tendon-bone allograft. In all cases, a 7 mm RCI screw (Smith and Nephew, Andover, Mass) was used in the trochanteric side and the grafts were secured on the acetabular side using a Richards Staple (Smith and Nephew, Andover, Mass). An abduction brace was used postoperatively in three patients for a duration of between six weeks and three months and two patients were allowed to mobilise without a brace.

No one had a dislocation post ligament reconstruction. In the four patients that were still living, three were mobilising independently and one patient was mobilising with a walking frame due to problems not relating to the hip which underwent the ligament reconstruction. All patients reported a high level of satisfaction following the ligament reconstruction.

There was one postoperative complication with a superficial wound infection at the donor site of the bone-patella tendon-bone graft that was successfully treated non-operatively with antibiotics.

5. Discussion

Recurrent instability of a total hip joint replacement is the most common reason for revision surgery.³ In the New Zealand Joint Registry Seventeen Year Report, the overall revision is 0.73/100-component-years, with the posterior approach having a higher revision rate for dislocation when compared to the lateral approach (0.21/100-component years vs 0.09/100-component years).³ The problem is not an insignificant one, with a lot of time, hospital resources, patient morbidity and health care dollars spent on addressing it.

In approaching the management of a patient with recurrent dislocations, there are many different algorithms suggested in the literature.^{1,4–6} The common theme amongst them is to initially identify correctable factors that are promoting the dislocation, whether it be patient, surgical or implant related. A thorough history, physical examination and appropriate radiological investigations to assess component alignment is essential. In cases where the reduction of an acutely dislocated hip is performed by an orthopaedic surgeon, the stability of the hip can be further assessed dynamically under fluoroscopy.

When no apparent cause for dislocation is readily identifiable, the literature is sparse with what to do next. Some researchers have suggested that the lack of posterior soft tissues structures may predispose a hip to dislocate. Pellicci et al. recognised this as a problem when he and his co-workers published a large series describing an enhanced posterior soft tissue repair for primary total hip replacements which significantly reduced their dislocation rate.² Surgeons have described in some patients, a large void or pseudocapsule posteriorly when performing surgery for recurrent dislocations.^{2,8,9}

Whether the deficient posterior soft tissues caused the initial dislocation or vice versa is a matter of debate.² The large posterior void can be seen as a pocket for the hip to dislocate into. In addition, with the lack of the posterior soft tissue structures, the hip range of motion is allowed to exceed the safe zone, impinging on the anterior structures, thus dislocating.^{2,8} The anterior hip capsule is thickened in some of these patients, however, in our series, we did not seek to identify this.

Constrained liners have traditionally been indicated for use and have been employed successfully in many cases of recurrent instability with no readily identifiable cause. They do however have their limitations, being prone to accelerated wear, loosening and dislodgement.^{6,7,10,11} They limit range of motion thus placing extraordinary stresses on the implants and are not particularly suitable for the younger patient. Berend et al. in a large case series of 755 patients reported their experiences with constrained liners and concluded that

apart from some exceptional cases, they have largely abandoned the use of these implants.¹² Sheth et al. in reviewing the literature recommend constrained liners only after exclusion of other causes of dislocation.¹

More recently, dual-mobility components have been used with increasing frequency bridging the gap between standard revision hip arthroplasty components and constrained liners. The design of these implants aims to increase the stable range of motion and increase the jump distance prior to the joint dislocating. While they have been used in Europe for over two decades, these implants have only recently been used in North America. The short to medium term studies of these components have been encouraging with success rates ranging from 90% to 98% in managing recurrent dislocations.¹³ However, these studies are small and long term data is lacking.

As an alternative method, we propose that reconstructing the ischiofemoral ligament is a viable option in some cases. There are limited reports in the literature of surgical techniques used to achieve this. Lavigne et al. reported a case series using using an Achilles tendon allograft to treat recurrent posterior instability of total hip joint replacements which was successful in 6 out of 10 patients.⁸ McGann et al. also described the successful use of a soft tissue augmentation using an Achilles tendon allograft in 3 patients.⁹ Their surgical technique however was different to that of Lavigne et al. They attached the calcaneal portion of the graft to the ischium then fed the tendon anteriorly through the soft tissues, looping it back onto the lateral surface of the trochanter and fixing it there. A fascia lata plasty for recurrent posterior dislocations was described by Stromsoe et al. and shown to be effective in preventing dislocations in 17 out of 22 patients.¹⁴ They used this technique for posterior, anterior and multidirectional instability noting that it was most successful for addressing posterior dislocations.

Other researchers have used synthetic grafts in an attempt to address instability. Barbosa and his colleagues described the use of a synthetic ligament graft looped around the neck of the femoral component and attached anteriorly to the superior pubic ramus to prevent the implant from dislocating posteriorly.¹⁵ Strictly speaking, this did not limit internal rotation, instead it reduced the ability of the hip to posteriorly translate. Fujishiro et al. reported the successful use of an artificial graft in reconstructing the iliofemoral ligament in one patient.¹⁶ Prior to the reconstruction, the patient had 4 revision operations which failed to address the anterior instability.

The ligament reconstruction in addition to limiting excessive motion, theoretically provides a scaffold for the formation of scar tissue.^{8,15} None of our patients have had a post mortem examination or returned to the operating room for subsequent surgery on their hips that have had the ischiofemoral ligament reconstructed. Lavigne et al. however reported tight posterior soft tissue scarring at the time of removal of implants in one of their patients.⁸ In addition, no allograft rejection was noted.

6. Conclusion

We suggest that the use of a bone-patellar tendon-bone graft is a viable method in addressing recurrent hip dislocations and should not

be discounted. The option of using either an allograft or autograft if the patient should so prefer gives more choice to both the surgeon and the patient. The additional implants used (surgical staples and interference screws) are commonly available in most orthopaedic units. Careful evaluation of the patient is essential. Prior to any ligament reconstruction being undertaken, all other causes of dislocation should be identified and addressed. In addition, when undertaking revision surgery, encountering a posterior soft tissue void should alert the surgeon to the possibility that revising the components alone may be insufficient.

Conflicts of interest

Both authors have no conflict of interest.

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