Why do orthopaedic surgeons get sued after **total hip replacement?**

Hip arthroplasty is a very successful operation and the outcome is usually excellent. There are recognised complications that seem increasingly to give rise to litigation. This paper briefly examines some common scenarios where litigation may be pursued against hip surgeons. With appropriate record keeping, consenting and surgical care, the claim can be successfully defended if not avoided. We hope this short summary will help to highlight some common pitfalls. There is extensive literature available for detailed study.

CONSENTING, DOCUMENTATION AND COMMUNICATION

Litigation after hip replacement can be minimised by spending time obtaining full consent, and ensuring accurate and detailed records are kept. This demands adequate time in clinic with the patient, answering their questions and documenting all aspects of the consenting process. In a busy clinic it is easy to cut corners, and in recent years cutbacks in funding have reduced secretarial and nursing support. The surgeon should always see the patient before undertaking surgery and we believe it is good practice to telephone a relative or friend of the patient's choice immediately following surgery to maintain and extend the line of communication established through the consenting process.

NERVE INJURIES

Nerve injury is a recognised complication after hip replacement surgery and is said to occur in approximately 1% of cases of uncomplicated total hip replacement (THR). It does not necessarily indicate suboptimal care.

It may affect the sciatic, obturator, or common femoral nerve. A higher incidence is described in revisions, hip dysplasia and women. The nerves may be at risk from ischaemia, heat, traction or compression from a number of causes including retractors, excessive leg lengthening, haematoma, sharp or hot instruments, power tools, wear debris, protruded cement, wires, screws, or component parts. It may be accidentally entrapped within sutures or get compressed in the gluteal sling during manipulation of the hip. However, the cause of almost 50% of all sciatic nerve palsies is unknown. The posterior approach is known to put the sciatic nerve at increased risk. In comparison, other nerves are less commonly affected.

It is important to identify and protect the nerve throughout surgery by visual identification or palpation, and document the steps taken. Extension of the hip and flexion of the knee help to relax the nerve. Care should be exercised when using power tools, sharp instruments, diathermy, positioning retractors, placing sutures and cerclage wires, and inserting screws. A high level of vigilance throughout surgery is essential.

If post-operative nerve palsy is identified, exploration may be indicated to rule out direct laceration, haematoma, release peri-neural or trans-neural suture or extruded cement. A clear record of the decision-making process (to explore or not to explore), should be included in the notes to explain that process.

There is a small patient population that will suffer from a sciatic nerve injury even where the surgeon has taken all precautions and this is therefore a recognised non-negligent complication of surgery. Detailed pre-operative consenting, meticulous technique and comprehensive documentation of protection of the nerve during surgery allow a defence to be formulated.

LEG LENGTH DISCREPANCY (LLD)

It is virtually impossible to guarantee equal leg lengths after THR. About a third of the normal population may have some asymmetry of leg lengths even before surgery which may have been imperceptible. Achieving a stable hip is a priority.

Minor inequalities in post-operative leg lengths are common after THR and are usually well tolerated. Leg lengthening is a recognised non-negligent consequence of a hip replacement. However, it is also a cause for dissatisfaction, pain, poor functional outcome, risk factor for nerve injury, requirement for revision surgery in some cases, and litigation. Therefore the surgeon should know how to minimise the risk of its occurrence. Some patients tolerate it better than others. Those with pre-operative pelvic obliquity from an abduction deformity may be more aware of it.

The patient's expectations should be appropriately managed prior to surgery and this discussion should be clearly documented to avoid unre-


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alistic expectations. Leg lengths are best assessed before surgery when the patient's attention can be drawn to any pre-existing discrepancy.

Intra-operative measurements using two fixed bony points on either side of the hip joint, and measuring with various described techniques (suture, diathermy cord, etc) before the hip is dislocated and during trialling is important. Thorough documentation that leg lengths were assessed before dividing the neck and after trialling the hip is useful in mounting a defence.

If there are intra-operative difficulties in achieving the optimal combination of length and stability, then recording the difficulty, trialled head and neck length options, and decision-making process is often helpful.

It is difficult, if not impossible, to specify a particular discrepancy beyond which it would be unacceptable or negligent. Most surgeons would regard a discrepancy of about 1 cm to 1.5 cm in routine cases as reasonable, and around 2 cm in some complex situations as unavoidable (whilst not desirable). In a routine uncomplicated case, unless there are extenuating circumstances, a true lengthening of 3 cm to 4 cm is difficult to justify or support. There are some suggestions that a discrepancy beyond 4 cm may lead to pain or sciatic nerve problems.

COMPONENT POSITIONING

It is well known to hip surgeons that accurate component positioning can be difficult in any form of hip replacement. This is especially so for positioning of the acetabular component. This may be affected by the position, inclination and abduction of the pelvis, movement of the limb and patient movement after positioning, or variation in the anatomy of the socket itself. This can occur even in the hands of experienced hip surgeons. In revision surgery, accuracy is even more challenging because of loss of the usual bony landmarks.

It can give rise to problems such as impingement, wear and instability. There is no single figure for perfect anteversion. A range is often found in practice to be compatible with good function and longevity. The combined anteversion of the acetabular component and femoral component is more relevant than isolated component version. Modern literature relating to metal-on-metal bearings suggests that vertical positioning of the cup may be associated with higher wear leading to increased failures. It has been proposed that optimal positioning of the acetabular component is approximately 15° to 20° anteversion with an inclination of 35° to 50°.

The original concept of a 'safe zone' has been challenged in recent times because of the tremendous variation in orientation of the pelvis, the difficulty in accurately positioning the socket, the increasing appreciation of host–host bony impingement and component–component impingement, and the less than robust older literature.

Tremendous variation has been identified in component positioning, even in the hands of expert hip surgeons. While optimal position is desirable, in clinical practice consistent positioning of the acetabular component remains a challenge. Less than optimal positioning is not always associated with failure or instability in the early post-operative stage, and good outcomes can be achieved even with less than optimal positioning.

DISLOCATION/INSTABILITY

Dislocation complicates between 1% and 3% of primary THRs and 7% to 10% of revision procedures, and is a recognised non-negligent complication after surgery. It may be related to patient factors (previous surgery, neurologic impairment, cerebral dysfunction, psychosis, alcoholism, female gender), surgical factors (approach, component orientation, soft-tissue tension, offset, prosthetic and/or bony impingement), or a combination of both. Increased incidence is reported in association with revision surgery, high dysplasia, avascular necrosis, femoral neck fractures and morbid obesity.

Dislocation remains a common reason for litigation, although it does not necessarily indicate substandard care. Thorough patient education during the clinic visit and explanation of the risk can help manage expectations. Although challenging, proper component positioning, appropriate soft-tissue balancing and avoidance of impingement are important but do not guarantee stability.

Pre-operative planning is important. Templating may help focus attention on anatomical variations, and help plan the restoration of the centre of rotation, leg lengths and offset. Where performed diligently it helps in defence if dislocation occurs. Documentation of anatomical or morphological variations, removal of osteophytes, component positioning, trial reduction, and assessment of intra-operative hip stability and length are also useful if it is alleged that dislocation has occurred because of negligence.

PERSISTENT PAIN

Despite the widely reported success of THR, some patients may complain of continuing discomfort or pain after surgery. Pain after hip replacement is often a reason for litigation. It is important to ensure correct patient selection and thorough diagnostic evaluation before surgery. Persistent pain does not always mean that the operation has failed. Alternative causes for the pain such as referred spinal pain, neoplastic or infective conditions, radiculopathy, vascular disease, meralgia paraesthetica and trochanteric pain syndrome, should be considered.

After surgery, the serious hip-related causes of persistent pain include aseptic loosening or infection but pain may be related also to impingement of the psoas, trochanteric pain, subtle nerve irritation problems, episodic subluxation and soft-tissue or tendon problems. It is important to adequately counsel patients before surgery to avoid post-operative dissatisfaction.

It is quite challenging to evaluate the painful hip after a radiologically satisfactory THR. Thorough clinical evaluation and a methodical approach to investigation are required. Commonly performed tests may include blood tests, plain radiographs, isotope scan, ultrasound, MRI or CT evaluation, spinal imaging, neurophysiological studies, guided injections, hip aspiration and biopsy, depending upon the specific scenario. There should be a low threshold for seeking a second opinion.

VASCULAR INJURIES

The incidence of vascular injuries after THR is extremely low but they may be life threatening. They may occur during, immediately afterwards

or in the late post-operative period. The pathology includes lacerations, pseudo-aneurysms, thrombosis, and AV fistulas involving the superficial femoral, iliac, common and profunda femoral arteries. Scenarios that are reported in the literature include cement leakage under the transverse acetabular ligament, screw penetration and anterior acetabular retractor-related injury amongst others.

Pre-operative assessment should include clinical assessment of vascular status, and further evaluation if required. Meticulous surgical technique and high clinical awareness for acute arterial injury should be present for early detection of the lesion.

CT scan with angiograms may help post-operative evaluation for intra-pelvic protrusion of cement or intra-pelvic acetabular components. Awareness of the anatomy of the pelvis and proximal femur is required in difficult revisions and complex primary THR. Jointly operating with a vascular surgeon in high risk cases should be considered.

Vascular complications may be better prevented or more efficiently treated by thorough pre-operative assessment and careful post-operative monitoring. Immediate vascular consultation is mandatory in major vascular injury. Early vascular surgical intervention is required as a life- and limb-saving operation.

INTRA-OPERATIVE PERIPROSTHETIC FRACTURES

Intra-operative periprosthetic fractures are becoming more common given the increased prevalence of revision THR and cementless fixation. Intra-operative fractures of the acetabulum are fairly rare but usually occur during reaming or the impaction of an uncemented component. On the femoral side it can be seen during a difficult dislocation of a stiff hip, femoral broaching or reaming, reduction manoeuvres, cement or prosthesis extraction in revision surgery, insertion of the femoral stem, more commonly an uncemented stem. In revision surgery the reported incidence varies from 3.6% to 20.9%.

Risk factors for intra-operative periprosthetic fractures include the use of minimally invasive techniques; press-fit cementless stems; revision operations, impaction grafting; female gender; osteoporotic bone, and metabolic bone disease, amongst others.

Appropriate treatment of intra-operative periprosthetic fractures should be ensured in order not to compromise the long-term results of THR. This may include fixation or revision to an alternative component.

DELAYED DIAGNOSIS/TREATMENT

Common reasons for litigation include missed or delayed diagnoses resulting in the claimant alleging prolonged pain suffering and loss of amenity.

This may apply in patients presenting with unexplained hip symptoms without an obvious radiological cause. It goes without saying that a thorough clinical evaluation is mandatory. Pain around the hip is not always related to arthritis. The cause of referred pain and other soft-tissue problems around the hip (meralgia paraesthetica, tendonopathy, trochanteric pain, etc) should be considered.

Labral disorders should also be considered when evaluating the young adult with hip pain. There is increasing recognition of labral pathology in association with dysplasia of the hip or femoroacetabular impingement. Acute labral injury of the hip may also rarely present in the young.

It is important to examine the spine and hip in cases of knee pain where the cause of pain is not obvious. This applies to adults as well as children. It is not uncommon in the elderly population for hip arthritis and spinal pathology (usually stenosis) to co-exist, with both contributing to the patient's symptoms and disability. It is good practice in these situations to warn the patient that after THR it is possible that a spinal procedure may be required or vice versa.

Large-head metal-on-metal total hip replacement and resurfacing has a much higher failure rate and higher revision rate than conventional THR (please see the article from J. P. Ivory, page 40). Unexplained pain remains a feature of this type of arthroplasty. There should be a low threshold for metal ion testing, hip aspiration and MARS sequence MRI scans. Standard radiographs do not exclude adverse reactions to metal debris. Aseptic loosening of the acetabular components in certain designs may not be radiologically obvious and can cause severe groin pain, as may psoas impingement related to some designs.

Infection has variable presentations. It should always be considered when evaluating a painful arthroplasty.

Most hospitals have care pathways to ensure compliance with the antibiotic and venous thromboembolic prophylaxis. If there is a reason to delay antibiotics until samples are obtained it should be documented. Similarly, if there are contra-indications to a particular type of prophylaxis, then the reasons should be discussed, documented and alternative safe techniques should be used. In difficult circumstances there is often a fine balance between the risks of thrombosis *versus* the consequences of uncontrolled bleeding. Antibiotic therapy after infected cases is best guided by local protocols and results of cultures in discussion with microbiologists, particularly in complex cases.

Obtaining an early second opinion in difficult cases is very helpful. We also find joint operating in complex cases tremendously beneficial, as is the norm in many units doing spinal deformity surgery.

COMMUNICATION WITH THE PATIENT

Inadequate consent prior to surgery is also a common allegation in negligence cases. It goes without saying that there are recognised and non-negligent risks of a THR as discussed above. It is important to counsel patients about risks and benefits and this begins with the first clinic visit. There is no substitute for a frank and honest discussion with the patient before surgery, outlining realistic aims and expectations. Many surgeons routinely copy their clinic letters to the patient detailing the discussion. Most units also routinely have patient education classes before surgery to allow dissemination of information and management of expectations.

In the event of a complication, honest channels of communication have to be maintained. Acknowledging and accepting that there may be a problem or suboptimal outcome, and genuinely trying to diagnose and treat it goes a long way towards avoidance of complaints and litigation. Doctors owe a duty of candour to their patients. It is often helpful to ask an experienced colleague to give an opinion. Maintaining good medical records is an essential principle of good medical practice and also helps in mounting a robust defence in the unfortunate situation where breach of duty by the surgeon or his team is alleged.

BIBLIOGRAPHY

Nerve Injuries

1. **Schmalzried TP, Amstutz HC, Dorey FJ.** Nerve palsy associated with total hip replacement: risk factors and prognosis. *J Bone Joint Surg [Am]* 1991;73-A:1074-1080.
2. **Farrell CM, Springer BD, Haidukewych GJ, Morrey BF.** Motor nerve palsy following primary total hip arthroplasty. *J Bone Joint Surg [Am]* 2005;87-A:2619-2625.
3. **Hurd JL, Potter HG, Dua V, Ranawat CS.** Sciatic nerve palsy after primary total hip arthroplasty: a new perspective. *J Arthroplasty* 2006;21:796-802.

4. DeHart MM, Riley LH Jr. Nerve injuries in total hip arthroplasty. *J Am Acad Orthop Surg* 1999;7:101-111.

Leg length discrepancy

5. Ng VY, Kean JR, Glassman AH. Limb-length discrepancy after hip arthroplasty. *J Bone Joint Surg [Am]* 2013;95-A:1426-1436.

6. Berend KR, Sporer SM, Sierra RJ, Glassman AH, Morris MJ. Achieving stability and lower-limb length in total hip arthroplasty. *J Bone Joint Surg [Am]* 2010;92-A:2737-2752.

Component positioning

7. Langton DJ, Jameson SS, Joyce TJ, Webb J, Nargol AV. The effect of component size and orientation on the concentrations of metal ions after resurfacing arthroplasty of the hip. *J Bone Joint Surg [Br]* 2008;90:1143-1151.

8. Langton DJ, Joyce TJ, Jameson SS, et al. Adverse reaction to metal debris following hip resurfacing: the influence of component type, orientation and volumetric wear. *J Bone Joint Surg [Br]* 2011;93-B:164-171.

9. Hart AJ, Buddhdev P, Winship P, et al. Cup inclination angle of greater than 50 degrees increases whole blood concentrations of cobalt and chromium ions after metal-on-metal hip resurfacing. *Hip Int* 2008;18:212-219.

Dislocation

10. Soong M, Rubash HE, Macaulay W. Dislocation after total hip arthroplasty. *J Am Acad Orthop Surg* 2004;12:314-321.

11. Zahar A, Rastogi A, Kendoff D. Dislocation after total hip arthroplasty. *Curr Rev Musculoskelet Med* 2013;6:350-356.

12. Hamilton WG, McAuley JP. Evaluation of the unstable total hip arthroplasty. *Instr Course Lect* 2004;53:87-92.

13. Brennan SA, Khan F, Kiernan C, et al. Dislocation of primary total hip arthroplasty and the risk of redislocation. *Hip Int* 2012;22:500-504.

14. Hailer NP, Weiss RJ, Stark A, Kärrholm J. The risk of revision due to dislocation after total hip arthroplasty depends on surgical approach, femoral head size, sex, and primary diagnosis. *An analysis of* 78,098 operations in the Swedish Hip Arthroplasty Register. Acta Orthop 2012;83:442-448.

Painful THA

15. Robbins GM, Masri BA, Garbuz DS, Duncan CP. Evaluation of pain in patients with apparently solidly fixed total hip arthroplasty components. *J Am Acad Orthop Surg* 2002;10:86-94.

16. Watson BS, Jenkins PJ, Ballantyne JA. The natural history of unexplained early poor function following total hip replacement. *Int Orthop* 2013; (Epub ahead of print) PMID:24052164.

Vascular injury

17. Barrack RL, Butler RA. Avoidance and management of neurovascular injuries in total hip arthroplasty. *Instr Course Lect* 2003;52:267-274.

18. Wasielewski RC, Crossett LS, Rubash HE. Neural and vascular injury in total hip arthroplasty. *Orthop Clin North Am* 1992;23:219-235.

19. Rossi G, Mavrogenis A, Angelini A, et al. Vascular complications in orthopaedic surgery. *J Long Term Eff Med Implants* 2011;21:127-137.

20. Troutman DA, Dougherty MJ, Spivack AI, Calligaro KD. Updated strategies to treat acute arterial complications associated with total knee and hip arthroplasty. *J Vasc Surg* 2013;58:1037-1042.

21. Parvizi J, Pulido L, Slenker N, et al. Vascular injuries after total joint arthroplasty. *J Arthroplasty* 2008;23:1115-1121.

Intra-operative fractures

22. Lindahl H. Epidemiology of periprosthetic femur fracture around a total hip arthroplasty. *Injury* 2007;38:651-654.

23. Davidson D, Pike J, Garbuz D, Duncan CP, Masri BA. Intraoperative periprosthetic fractures during total hip arthroplasty: evaluation and management. *J Bone Joint Surg [Am]* 2008;90-A:2000-2012.

24. Rayan F, Haddad F. Periprosthetic femoral fractures in total hip arthroplasty: a review. *Hip Int* 2010;20:418-426.