

Painful total hip arthroplasty

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Abstract

Total hip arthroplasty (THA) is a common surgical procedure that improves patients' quality of life and function with great and reproducible success. However, long-term pain is experienced in 7–23% of patients. This article discusses potential predisposing factors, their aetiology and the subsequent evaluation of persisting pain after THA. A thorough, structured approach to clinical history and examination allied with knowledge of potential differential diagnoses will help focus subsequent investigations to determine the cause. Diagnosis allows the provision of the most appropriate nonoperative or operative treatment course.

Keywords Assessment; diagnosis; evaluation; pain; total hip replacement

Introduction

Total hip arthroplasty (THA) is one of the successful surgical procedures in modern medicine. There are almost 2.55 million people living with a THA in the USA alone. THA favourably impacts the vast majority of patients' general health, quality of life and functioning while being a cost-effective surgical procedure. Hip pain is one of the most important indications for THA. THA can allow enduring improvement in physical function for over 25 years and is generally unaffected by mild pain.¹

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Despite the reported levels of improvement, between 3.3% and 16.8% of patients are not completely satisfied with their outcome post-THA, with the incidence of chronic pain reported as varying between 7% and 23%.² This can be due to functional limitation or activity related pain, where walking and climbing stairs remain uncomfortable for patients. Britton et al.³ characterized the pattern of pain following THA in 2000 patients, demonstrating that pain improved considerably during the first 6 months, followed by a modest amelioration of pain over the following 2 years and in some cases up to 4 years. However, a subset of patients seem to not have any improvement in pain beyond 12 months post-THA.

The end stage for progressive THA pain is revision surgery. Sadoghi et al.⁴ used world-wide registry data to identify that the common causes for THA revision are aseptic loosening (55.2%), instability (11.8%) and septic loosening (7.5%) while 3.5% were done for 'pain without other cause'. It is therefore important to understand the variability, natural history and appropriate timing of investigations and treatment of 'the painful THA'. This is especially the case in those patients with new onset or suddenly worsening pain.

Predictors of pain after THA

Certain patient groups may be more susceptible to dissatisfaction and pain after THA. It is therefore important to identify those patients who require extended counselling prior to THA and attempt risk reduction where possible. Local registry data may assist in identifying commonly encountered co-variables of reported THA pain. The Swedish hip registry (approximately 35,000 cases) identifies that although satisfaction with THA is almost 90%, the presence of pain in several joints, advanced age and male gender were predictive of poorer outcomes. Other considerations should include education, comorbidities and mental health.

Whilst complaints of pain from multiple sites prior to THA has been shown to predict poorer outcomes, the impact of age and gender is controversial. A prospective double blind randomized study that showed that there was no correlation of pain with age. Age may be a greater predictor of the degree of functional improvement than the extent of pain relief. Gender appeared to make no difference to the likelihood of pain after THA, although in the same study, Singh et al.⁵ noted that females more often reported extended NSAID and opioid use.

A greater improvement in pain has been noted in patients with a higher level of education. MacWilliam et al.⁶ described how a statistically significant ($p < 0.01$) change in pain score for each additional co-morbidity was evident in patients with a low level of education. Patient expectations also affect post-operative outcomes. A strong understanding and belief that THA will result in pain relief results in a greater likelihood of improvement in the pain component of the WOMAC score. The amount of time spent waiting for surgery is not significantly associated with persistent hip pain post-THA.⁷

Depression and diabetes are both associated with greater probability of post-THA pain. Adequate control and counselling should be considered in these patient groups. Moderate to severe pain was significantly related to depression in a retrospective review of 5707 THAs at 2 years' follow-up, but not in 3289 THAs at 5 years.⁵ Diabetes is a risk factor for persistent pain

1–2 years after primary THA. This may be as a result of a chronic systemic pro-inflammatory state, or due to glucose control and diabetes-related complications, such as neuropathy.

In a review of 42,233 patients on the Swedish Hip Arthroplasty Register, Rolfson showed that more patients had a lower incidence of pain with the posterior hip approach versus the direct lateral approach (78% vs 74%) at 1 year. This correlation persisted to 6 years follow-up.⁸ Pain during the immediate post-operative period may impact on pain intensity profiles 6 weeks later but does not seem to influence the persistence of pain at 6 months.

Causes of painful THA

A systematic approach is imperative to determine the underlying cause of pain after THA. This ultimately determines the most appropriate course of nonoperative, pharmacological or surgical management. The causes of a painful THA can be divided into intrinsic (involving the prosthetic implants and hip joint) and extrinsic pathologies. The causes are listed in Table 1 with a complementary flow diagram, Figure 1, included as a summary of recommendations and for reference.

Intrinsic causes

An intrinsic cause of pain is derived from the hip joint itself. Intrinsic causes may be further categorized as intra-capsular or

extra-capsular. Sources of intrinsic pain include mechanical loosening, infection, modulus mismatch, impingement caused by soft tissue or bone and pain as a consequence of synovitis originating from polyethylene debris, metal hypersensitivity or allergy.

It is essential that periprosthetic joint infection (PJI) is a foremost consideration in any differential diagnosis for painful THA. The rate of PJI may be up to 3% in primary THA. The high index of suspicion for PJI is paramount as subsequent management of septic failure is vastly different from aseptic causes. Diagnosis is based on the findings of raised inflammatory markers, positive cultures from hip aspiration and suggestive radiographic findings such as endosteal scalloping and periosteal reaction.

Pain may be caused by aseptic loosening of implants. In general, a loose femoral component classically provokes thigh pain. Loose acetabular components commonly result in groin pain or can induce isolated buttock pain. This pain is usually more distal than mechanical pain derived from the lumbar spine. Aseptic loosening may be diagnosed radiographically by observing progressive implant movement or radiolucencies at the bone interfaces. Fibrous ingrowth and resultant implant micromotion may render THA painful despite the appearance of radiographically well-fixed components.

The rate of postoperative periprosthetic femoral fractures varies from 0.1% to 5.4% as shown by Berry et al.,⁹ where the incidence of periprosthetic fractures was reported to be 0.3% in 20,859 primary cemented THAs and 5.4% in 3121 uncemented THAs. Data from the Swedish National Hip registry show the average time from implantation to fracture was approximately 7.4 years in a primary THA and 3.9 years in revision THA. Studies using data from the Mayo Clinic and the Swedish registry showed that 94% and 70% of patients respectively had stem loosening before fracturing.¹⁰ Insufficiency fractures of the pubic rami may exist after THA which can also result in pain.

A difference between the modulus of elasticity of the bone and the implant exists and is a rare cause of pain, ordinarily in the thigh. This pain is generated as a result of the stress transfer mismatch between the implant and the host bone. Stem geometry, size composition and porous coating can influence this phenomenon. The prevalence of thigh pain has been linked to increased size of femoral stem.

Impingement of the components may culminate in pain from instability or soft tissue irritation. Subluxation or dislocation as a consequence of hip instability causes capsular distension and soft tissue trauma, inducing pain. The capsule may be impinged or compressed between the neck and cup or between the greater trochanter and ilium. This is influenced by component design, alignment and abductor tension and function. Sources of instability and or impingement such as areas of cement, osteophytes or component malalignment may be delineated by computed tomography (CT) scan.

Iliopsoas tendinitis may result from inadequate acetabular anteversion or disproportionate antero-inferior overhang. This groin pain is provoked by active and resisted hip flexion. It may limit a patient's ability to easily climb stairs, get into and out of vehicles or put on trousers as a consequence of painful hip flexion. Image-guided infiltration of local anaesthetic may be diagnostic and therapeutic.

Causes of pain following total hip arthroplasty

Intrinsic		Infection
		Aseptic loosening
Extrinsic	Local	Instability
		Pain at stem tip
		• Modulus mismatch
		Synovitis
		• Polyethylene debris
		• Metal hypersensitivity
	• Crystalline arthropathy	
	Remote	Impingement
		• Bone (GT/pelvis)
		• Soft tissue
		Bursitis
		Tendonitis
Heterotopic ossification		
Remote	Stress fracture	
	Spine	
	• Facet arthritis/spondylosis	
	• Radiculopathy	
	• Stenosis	
	Neuropathy/nerve entrapment	
	• Femoral, obturator, sciatic	
	• Lateral femoral cutaneous	
	Vascular claudication	
	Hernia	
• Abdominal		
• Vastus lateralis/fascia lata		
Tumour		

GT, greater trochanter.

Table 1

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