The evolving scope of minimally invasive surgery has driven the gradual increase in the application of hip arthroscopy for peri-articular problems of the hip. There is a greater understanding of various disorders of the hip, such as greater trochanteric pain syndrome, internal snapping hip syndrome, deep gluteal syndrome and ischiofemoral impingement. These can now potentially be treated by endoscopic means.

**Greater trochanteric pain syndrome**
Greater trochanteric pain syndrome includes a constellation of hip disorders such as recalcitrant trochanteric bursitis, external snapping iliotibial band (ITB), and gluteus medius and minimus tears. It is quoted at 1.8/1000 head of population. All these present as chronic pain over the lateral aspect of the hip. The diagnosis of trochanteric bursitis is confirmed by the history, examination and response to a possible injection. Although MRI is not necessary to make the diagnosis, fluid-sensitive images may reveal increased signal intensity of the trochanteric bursa. External snapping hip or coxa saltans may occur when a thickened portion of the posterior margin of the iliobial band or the anterior fibres of the gluteus maximus tendon slide over the greater trochanter. This band lies posterior to the greater trochanter when the hip is extended and slides anteriorly over it during flexion. Dynamic ultrasound may display the real-time images of the ITB snapping over the greater trochanter.

Tears in the gluteus medius and minimus tendons are often misdiagnosed as trochanteric bursitis. They share similarities to the rotator cuff tendon injuries in the shoulder and are associated with increasing age. These may be intrasubstance, partial or complete; with partial thickness undersurface tear being more common. Physical examination may reveal pain and weakness with resisted abduction of the hip with slight Trendelenburg gait. The combination of abductor weakness, persistence of symptoms after conservative treatment, and a positive MRI result that shows increased signal in the tendon confirms the diagnosis.

It has been proposed that patients with persistent symptoms after two corticosteroid injections for trochanteric bursitis may require operative intervention. The endoscopic release of the ITB for the treatment of external snapping and trochanteric bursitis is an effective and reproducible procedure and may lead to 100% resolution of pain and 91% resolution of snapping symptoms. Similarly satisfactory outcome after surgical repair of the gluteus medius and minimus tears and release of the ITB has been reported.

**Internal snapping hip syndrome**
The iliopsoas tendon slipping either over the femoral head or the iliopsoas eminence causes internal snapping hip syndrome. The patients present with pain and sensation of snapping in the groin particularly on hip extension. Endoscopic release of the iliopsoas tendon can lead to effective relief of pain and snapping. The results of endoscopic release seem to be better than those reported for open procedures.

**Deep gluteal syndrome**
Deep gluteal syndrome is a term given to pain in the buttock caused by sciatic nerve entrapment from any of the structures in the gluteal region. This may be piriformis syndrome, which is associated with buttock pain that is exacerbated by hip flexion movements combined with internal or external rotation of the affected leg. It often occurs after blunt trauma to the buttock with resultant haematoma formation and subsequent scarring between the sciatic nerve and external rotators. The proximal origin of the hamstrings has an intimate relation with the sciatic nerve and scarring of the hamstring tendons by trauma or avulsion of the hamstring may be a cause. Similarly, irritation of the structures of the obturator internus/gemellus complex may cause sciatica-like discomfort. Pre-operative bilateral dynamic EMG testing, MRI myelogram of the lumbar spine, a piriformis injection test, intra-operative nerve monitoring and elimination of the other sources of posterior hip pain are integral to the correct diagnosis. Arthroscopic techniques for treating piriformis syndrome and release of sciatic nerve have been demonstrated to be effective in diminishing extra-articular posterior hip pain and return to normal activities.

**Ischiofemoral impingement**
Ischiofemoral impingement has been described in the past after total hip replacement, and also lately in the native hip. It is caused by abnormal contact between the lesser trochanter and ischiium. The quadratus femoris muscle occupies this space and may theoretically be compressed between these two bony structures. The patients present with chronic pain in the groin and/or the buttock. This may radiate distally along the leg. The differential diagnoses have included a snapping iliopsoas tendon, sciatica, chronic hamstring injury and adductor tendonitis. Clinically the symptoms may be reproduced by a combination of hip extension, adduction and external rotation. MRI is the imaging method of choice, with special attention paid to the ischiofemoral space.

Radiologically guided infiltration of corticosteroid into the ischiofemoral space has been reported to be useful. The definitive treatment for ischiofemoral impingement is not yet clear as it has not been widely recognised. However, arthroscopic debridement of the quadratus femoris tendon with removal of the impingement lesion is an option that can be explored.
Portal placement and procedure

Portal placement for the peri-trochanteric space has been previously described. It is a matter of individual preference and depends on the pathology being treated, although the same portals used to access the central and peripheral compartment can be used to gain access to the peri-trochanteric space. For sciatic nerve decompression an auxiliary posterolateral portal may be useful.

A 30° arthroscope is ordinarily used. Balloon dissection has been shown to be superior to blunt dissection in terms of access, safety and haemostasis. Voos et al recommend that the arthroscope should be first orientated towards the gluteus maximus insertion into the linea aspera, as well as the vastus lateralis. A step-wise examination of various parts of the peritrochanteric area should be performed including the gluteus maximus insertion (Figure 1 and 2), vastus lateralis, fibres of gluteus medius and minimus inserting onto the greater trochanter and the ITB. A thorough knowledge of the normal anatomy of the tendon insertions, the bursae, and the bony facets of the greater trochanter is essential. The fibres of the gluteus medius lie posterior to the minimus and should be thoroughly probed and inspected to identify the presence of full-thickness tears of the tendon insertion. The posterior one-third of the ITB is implicated in external snapping hip syndrome and may be causing direct abrasive wear of the greater trochanter. Assessment for abductor tendon tear should be performed in cases in which there is no clinical concern of an external snapping hip.

The ITB can be approached either from the peritrochanteric space where the deep surface of the ITB is visualised first or by the subcutaneous approach where the superficial surface is initially visible (Figure 3). Release of ITB is performed along the posterolateral portion of the greater trochanter, beginning at the insertion of the vastus lateralis at the vastus tubercle, extending to the tip of the greater trochanter in a V-Y type release (Figure 4), which is the senior author’s preferred technique. The ITB is fully released until it no longer rubs, causing impingement over the greater trochanter; and this is confirmed by hip rotation under arthroscopic view. There may be a requirement for slight variation depending on the particular fibres under the greatest amount of tension. A repair of the V-Y plasty can be performed (Figure 5). Alternatively, excision of a diamond shaped area from the ITB has been described. Prominent bone over the lateral aspect of the greater trochanter may need to be debrided along with a formal bursectomy (Figure 6).

Martin et al have described the endoscopic approach to identifying and dealing with DGS. After examining the peritrochanteric space to look for the various causes of hip pain they would proceed to a stepwise examination of the sciatic nerve (Figure 7). This would include an arthroscopic assessment of the excursion of the sciatic nerve with the leg in flexion and internal/external rotation and full extension with internal/external rotation. Inspection of the sciatic nerve would begin distally beneath the femoral insertion of the tendon of gluteus maximus and proceed upwards to the sciatic notch. A blunt probe can be used to assess sciatic nerve entrapment by the quadratus

Fig. 1. Arthroscopic picture with vastus lateralis to left and above and insertion of gluteus maximus tendon to the right.

Fig. 2. Arthroscopic debridement of the trochanteric area adjacent to the gluteus maximum tendon insertion.

Fig. 3. Inflamed ITB visible from the superficial side.

Fig. 4. V-Y plasty of the ITB being performed from the superficial side.
femoris, gemelli, fibrovascular scar bands and the piriformis. Any impinging structures on the sciatic nerve can be released by delicate dissection and the range of movement of the hip can be repeated to ensure adequate mobility of the sciatic nerve.

The iliopsoas tendon can be exposed after an anterior capsulotomy while examining the peripheral compartment of the hip. The tendon can be located by identifying the medial synovial fold that lies slightly medially underneath the anteromedial capsule at the level of the psoas tendon. A fluoroscopic assessment of the position of the tip of the arthroscope and the instruments along the probable track of the iliopsoas as it inserts into the lesser trochanter is helpful. The site of release of the iliopsoas tendon is critical. To release it proximally, through the capsule at the level of the hip joint, leaves the muscular part of iliopsoas intact. This minimises any reduction in the strength of hip flexion and allows the surgeon to directly view tendon excursion during the procedure. Anteriorly located branches of the femoral nerve can theoretically be damaged at surgery although the risk is reduced if iliopsoas is released distally, at the lesser trochanter. Here, the iliopsoas tendon can be easily seen and is separated from the femoral nerve by a bursal wall and vastus intermedius.

It has been shown that iliopsoas tendon release at the level of the lesser trochanter or at the level of the hip joint using a transcapsular technique is both effective and reproducible and leads to similar clinical results. Recalcitrant trochanteric bursitis, external snapping hip syndrome, and focal, isolated tears of the gluteus medius and minimus tendons may now be successfully treated arthroscopically. As the arthroscopic anatomy of the hip becomes more clearly defined and surgical indications clarified, the range of available treatment options for disease entities of the peri-articular space of the hip will undoubtedly increase. This is clearly a rapidly developing frontier of modern-day hip surgery.

Conclusion
Recalcitrant trochanteric bursitis, external snapping hip syndrome, and focal, isolated tears of the gluteus medius and minimus tendons may now be successfully treated arthroscopically. As the arthroscopic anatomy of the hip becomes more clearly defined and surgical indications clarified, the range of available treatment options for disease entities of the peri-articular space of the hip will undoubtedly increase. This is clearly a rapidly developing frontier of modern-day hip surgery.

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