Nicolas Bonin
Filippo Randelli
Vikas Khanduja
Editors

Hip Preservation Surgery

Open, Arthroscopic, and Endoscopic Techniques

European Society of Sports Traumatology, Knee Surgery & Arthroscopy
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Editors
Nicolas Bonin
Hip and Sports Medicine Unit
Lyon Ortho Clinic
Clinique de la Sauvegarde
Lyon
France

Vikas Khanduja
Young Adult Hip Service
Addenbrooke's - Cambridge
University Hospital
Cambridge
UK

Filippo Randelli
Hip Department (CAD)
Gaetano Pini - CTO Orthopedic Institute
University of Milan
Milan
Italy

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Foreword

Hip preservation surgery has grown dramatically in the last decade. This is evident by the growth in research publications, organized societies that address the hip, and advanced courses in surgical intervention. Once thought of as a simple "ball and socket joint," the increased understanding of the mechanics of the hip joint as well as renewed interest in conditions that affect the hip has led to the development of new diagnostic and treatment strategies. With this growth in knowledge, there is not only an opportunity to help patients who seek our care but also the challenge of filtering through a vast amount of novel information. This process of determining what works and how in order to preserve the hip joint is critical to enhance our ability to provide beneficial treatment strategies. As such, a resource that provides a wealth of knowledge from expert clinicians based on contemporary techniques and sound clinical research is needed. This book, with input from such renowned experts, provides a resource that addresses conditions that affect the hip using strategies that are both open and arthroscopic for the purpose of long-term hip preservation. I congratulate all of the contributors from authors to editors on a job well done in completing such an important and comprehensive book on hip preservation surgery. This book will certainly educate clinicians and help advance patient care.

Olufemi R. Ayeni
McMaster University
Hamilton, ON, Canada

Preface

In the era where Total Hip Replacement surgery is flourishing and there are so many other texts already existing on hip preservation surgery, another textbook on the same niche area may seem unnecessary by the vast majority of orthopedic surgeons.

However, we are three friends in different parts of Europe and despite Brexit had the same passion of educating on and advancing surgical techniques in hip preservation surgery, and were up for the challenge.

The challenge was to compile and edit a brand new textbook focusing mainly and specifically on the most practical and technical part of hip joint preservation, which is often a fairly demanding procedure. The focus was to make the text as concise as possible but at the same time be comprehensive about the pathology. The other objective was that the text should also include a lot of visual aids to help surgeons to actually understand the steps involved in the procedure and tips and tricks to make the procedure easier.

ESSKA, as a leader in arthroscopic and joint preservation surgery with a good track record of excellent titles in this arena, also needed to fill the gap in their portfolio as far as the hip joint was concerned and welcomed our initiative with open arms and enthusiasm and actioned it with due diligence. This and the excellent project management and editorial help from Springer are the main reasons as to why this multi-author text was ready in record time.

As you will see from the contents of the book, we have addressed all the pathologies and selected a terrific brigade of surgeons from the members of ESSKA Hip Committee and the most renowned key opinion leaders in hip preservation surgery from across Europe to help us with the chapters. The authors were allocated the topics based on their area of expertise and most importantly their passion for that particular pathology and surgical technique.

Each author has contributed immensely and has developed a product that has surpassed all our initial expectations—a deep dive into surgical techniques with tips and tricks, high quality photographs and videos, to help all of us and eventually for the betterment of our patients.

We are incredibly grateful to all our authors for their excellent contribution, Springer and all their staff especially Ms. Vinodhini Subramaniam for their project management and editorial help, ESSKA for believing in us and

giving us this wonderful opportunity, and to all those involved in the realization of what we already jokingly call a "must-have" book.

It certainly has been *a labor of love* and we have had a great time in producing this book. We sincerely hope that you find it useful and enjoy it as much reading it as we have enjoyed producing it.

Lyon, France — Nicolas Bonin
Milan, Italy — Filippo Randelli
Cambridge, UK — Vikas Khanduja

Contents

About the Editors

Nicolas Bonin, MD, MS, DESC is an orthopedic surgeon specializing in hip surgery and sports traumatology. He is a founding member of Lyon Ortho Clinic in Lyon, France, where he heads the Hip and Sports Medicine Unit. He gained his MD, master's degree in Biological and Medical Science, and DESC (Diplôme d'Études Spécialisées Complémentaires) from the Faculty of Medicine and Pharmacy in Besançon, in 2001, 2002, and 2004, respectively. He holds a Diploma in Arthroscopy from the Faculty of Medicine, Paris Ouest, and is now a training member of this diploma on behalf of the French Arthroscopy Society. Dr. Bonin is a member of the ISHA Board of Directors and participates in numerous hip committees for scientific societies (ESSKA, ISAKOS, SFA). He is the author of more than 30 original articles, many of which relate to the hip, as well as numerous book chapters.

Filippo Randelli, MD is an orthopedic surgeon specialized in hip and trauma surgery at Gaetano Pini -CTO Orthopedic Institute University of Milan. He graduated in Medicine from the University of Milan in 1996 and completed an AO Trauma Fellowship in Trauma at the Hospital for Special

Surgery, New York, in 1999. He passed the Italian Orthopaedic and Trauma Board examination (70/70 cum Laude) in 2001. Since 2010 he has been a Contract Professor on the Milan Orthopaedic and Traumatology Residency Program. Dr. Randelli is a Consultant Editor for the *Journal of Orthopaedics and Traumatology* and Chair of the ESSKA Hip Arthroscopy Committee. He is the author of numerous original articles.

Vikas Khanduja, MA, MB BS, MSc, FRCS (Orth) is a Consultant Orthopedic Surgeon in the Department of Trauma and Orthopaedics, Addenbrooke's Hospital, Cambridge, UK. He is an Associate Lecturer in the Faculty of Clinical Medicine at the University of Cambridge and the Lead for Elective Clinical Trials. He has been instrumental in setting up the tertiary referral service for Young Adult Hip Surgery in Cambridge and has authored over 100 peer-reviewed articles and two books. He has won numerous awards, sits on the Board of Directors for SICOT as Chair of the Education Academy and the British Hip Society as the Chairman for the Non Arthroplasty Hip Register (NAHR), and is the Associate Editor of the *Bone and Joint Journal*.

Part I

Synovium

1 Joint Lavage, Synovectomy, Biopsy, and Loose Body Removal

Idriss Tourabaly and Thierry Boyer

1.1 Introduction

Hip arthroscopy is actually the best technique to treat synovial hip disease. Synovial pathologies are wide, but two diagnoses must be known by the hip surgeon: synovial chondromatosis [1–3] and villonodular synovitis [4–6]. These rare pathologies are developed from a metaplasia of synovial membrane. Young adult with mechanical hip pain with normal x-ray should be explored for synovial disease.

Synovial chondromatosis is a benign disorder characterized by cartilaginous nodules (chondromas) or secondary ossified chondromas when the pathology is more advanced (osteochondromas) [7]. There are two categories: primary osteochondromatosis and secondary osteochondromatosis in which cartilage and bone fragment are secondary to trauma or osteoarthritis. Those nodules can be embedded or pedunculated or become free loose bodies in the joint cavity. Most of the time, chondromas are localized in the peripheral compartment of the hip, particularly in the different synovial recess. However, the central compartment must be checked to assess chondral status and search for agglutinated chondromas under the fovea. The risk of recurrence depends on the stage of disease described by Milgram. When chondromas are totally free, it means that synovial is inactive with less risk of recurrence of chondromatosis. Prognosis is evaluated by cartilage injury and chondropathy. If the chondral status is acceptable, a re-arthroscopy can be proposed in the event of iterative chondromatosis. If the chondral lesions are too advanced, THA should be discussed [8].

Villonodular synovitis is a benign synovial proliferation [9, 10]. Two forms exist: localized form characterized by firm consistency nodule, sessile or pedunculated, with sometimes colored hemorrhagic staining, and diffuse form where we can see major hypertrophic synovial proliferation. Synovial takes villous or nodular aspect. Color of synovial is typically ocher or brown or red/brown stain. Risk of recurrence is high in diffuse form and depends of our ability to perform a total synovectomy. Diffuse form with associated chondropathy has low prognosis [11]. Risk of recurrence in diffuse form is up to 50%. At term, joint destruction needs THA.

Synovial pathologies are difficult to treat. Visualizing the different capsular recessus where synovial and free loose bodies can accumulate can be challenging.

It is important to take time for exposition to avoid iatrogenic injury. Patients are most of the time young, and preserving them from chondral iatrogenic lesion is fundamental. In rare cases, it could be less invasive to practice a little Hueter

Electronic Supplementary Material The online version of this chapter (https://doi.org/10.1007/978-3-662-61186-9_1) contains supplementary material, which is available to authorized users.

I. Tourabaly (✉) · T. Boyer
Clinique Maussins - Institut Nollet, Paris, France

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approach with assistance of arthroscopy to treat the central compartment [12–14].

Planning a surgical procedure with complete imaging improves the quality of synovectomy or helps to decide the best way to catch free loose bodies. For example, if joint is totally filled with hundreds of large diameter loose bodies, any cannulas or grasper will manage it, so it can be a good indication for a first open arthrotomy.

1.1.1 Arthroscopic Technique [15–18]

Addressing synovial pathology requires arthroscopic skills and some experience to explore all hip joint compartment safely without iatrogenic injury [19].

The setting in operating room is classic and depends on your own way to practice hip arthroscopy. It can be supine or lateral setup.

Approach can be through the central first technique with traction and use of fluoroscopy. The second technique is to use a peripheral first technique to access the two peripheral compartments (proximal and distal) without any traction and any fluoroscopy. We use this peripheral first technique in our daily practice. This technique was published in 2014 [17] (Fig. 1.1).

1.1.2 How to Visualize Medial Recessus?

Often, extensive synovitis or chondromas are localized in medial recessus. Access to this part is not common when we address femoral cam, for example.

Fig. 1.1 Access to the peripheral compartment first without traction and without fluoroscopy

Fig. 1.2 Lots of ossified chondromas filling medial recessus seen on a TDM exam

A tip for all arthroscopic procedures is to switch portal and scope to improve exposition and have better visualization (Fig. 1.2).

Basically we use number 1 and number 4 portals to explore anterior and medial part of the joint. Portal numbers 2 and 3 are used only if visualization is not enough. Never pass through the medial side of the vertical line drawn from the ASIS (Figs. 1.3 and 1.4).

1.1.3 Instruments

Extractions of loose bodies don't need specific instruments but a variety of instruments to adapt to different situations. It depends on the size and shape of chondromas and location of those.

You can use the following:

- Different sizes of cannulas to extract free loose bodies by suction +++ (Fig. 1.5)
- Classical forceps (Fig. 1.6)
- Fragmentation
- Curved instrument to access foveal area
- Mega-graspers for big-sized chondromas (Fig. 1.7)

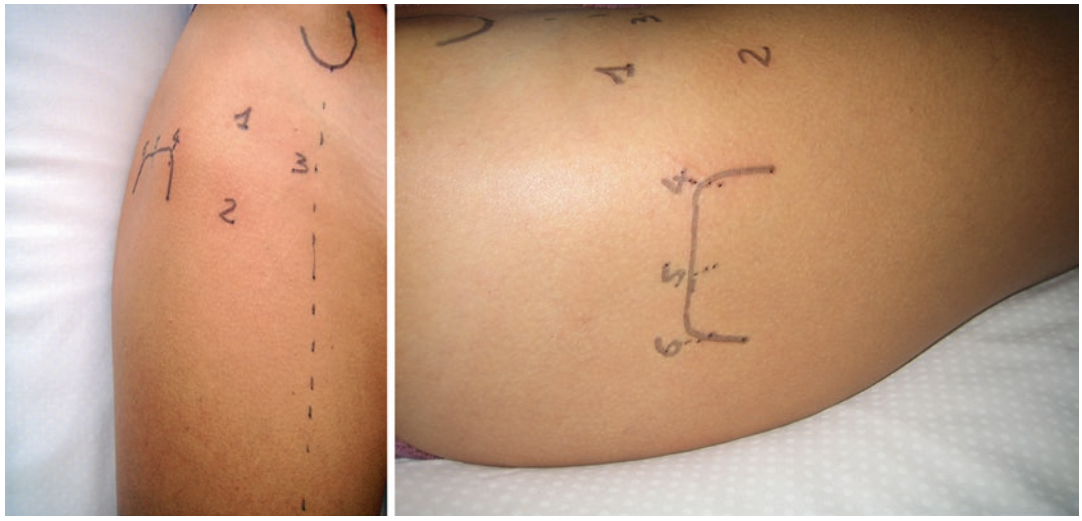

Fig. 1.3 Basic hip arthroscopic portal. Number 1 and 4 are often used

Fig. 1.4 The classical test with needle and nitinol guide is important to ensure you are inside the joint before introducing instruments

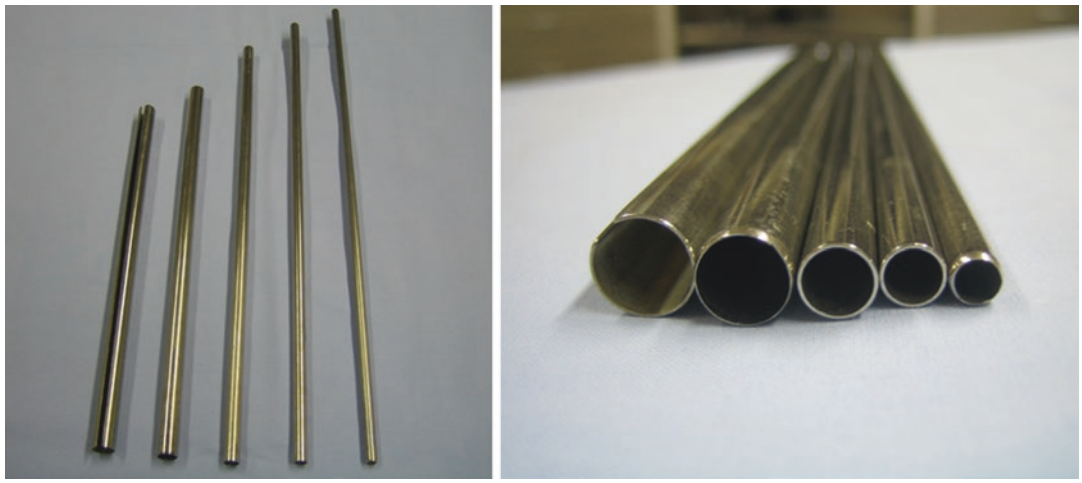

Fig. 1.5 Different sizes of cannulas

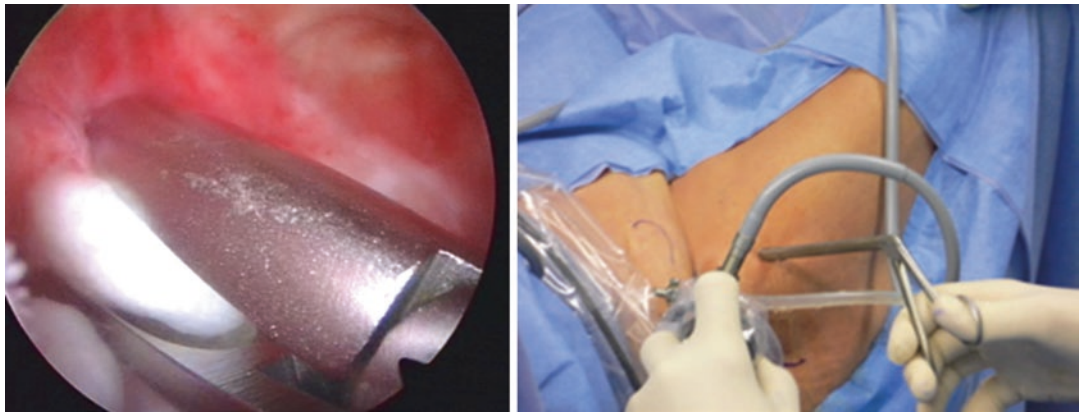

Fig. 1.6 Classical grasper for small- or medium-sized chondromas

Fig. 1.7 Mega-grasper is useful to catch big chondromas

1.2 Villonodular Synovitis

Arthroscopic treatment of pigmented villonodular synovitis is similar for all synovial pathology. The more complete synovectomy will be practiced; the best result will be attempted. The quality of synovectomy is directly correlated to the risk of recurrence.

Incidence of villonodular synovitis is estimated around 1.8 cases per million persons per year [20, 21]. That is why only few reports with small cases are available related to arthroscopic procedure [11, 22–25].

Tips and Pearls for Synovectomy

How to enhance exposition when bleeding?

- Reduce blood pressure.
- Increase arthropump pressure temporarily.
- Put the scope close to the bleeding area.
- Be careful when synovectomy extends to the "posterior blind zone."
- Do not forget to perform biopsies of the synovitis and around the lesion.

1.2.1 Synovectomy

It is important to take time to practice a large synovectomy [26–28]. This procedure could be difficult because of hemorrhagic suffusion inside the joint cavity. Reduced blood pressure can help, if possible for the anesthesiologist team. Temporarily increased arthropump pressure is also useful. Exposition is often enhanced when scope locates close to the bleeding area. Thus, it becomes easy to electrocoagulate a small hemorragia with radiofrequency probe.

Instruments that we will use for synovectomy are the shaver (straight or curved for the fossa) and radiofrequency probe (straight or curved).

Exploring the posterior part of cavity is important to assess extension of synovitis. Synovectomy

of this "posterior zone" could injuried the blood supply of femoral head. In reality, complete synovectomy under arthroscopy remains impossible.

Last point is to perform several biopsies of the synovitis but also around the lesion for histologic analysis.

1.2.2 Diffuse Form of Villonodular Synovitis

Diffuse form of villonodular synovitis is difficult to treat [12]. Synovitis extends basically to all the joints. A total synovectomy is quite impossible to perform arthroscopically. However, arthroscopic procedure remains a less invasive technique if you take into account that open procedure in those cases is difficult too and increases probability of comorbidity (Figs. 1.8, 1.9, 1.10, and 1.11).

1.2.3 Nodular Form of Villonodular Synovitis

When a nodular form of villonodular synovitis is identified, an arthroscopic procedure can definitely heal your patient (Figs. 1.12 and 1.13).

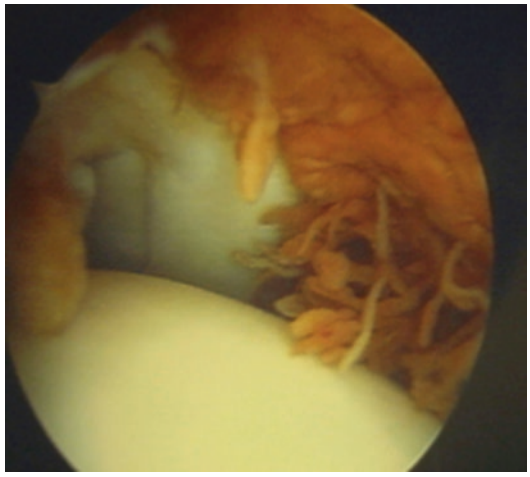

Fig. 1.8 A typical diffuse form of villonodular synovitis in the peripheral compartment

1.3 Chondromatosis

Synovial chondromatosis is difficult to treat because it requires a total synovectomy for embedded or pedunculated chondromas [22, 29]. The risk concerns injury of the blood supply to femoral head if synovectomy extends to the posterosuperior head-neck junction [30, 31].

In order to extract maximum of chondromas, high-quality imaging (X-ray, arthro-CT, MRI) helps to plan preoperatively the procedure.

1.3.1 Size and Shape of Chondromas

Small-sized and free chondromas are the easiest cases. We can extract all the loose bodies with cannulas and suction (Figs. 1.14 and 1.15).

Sometimes, chondromas can hide in the different joint recessus. Moving and shaking your patient leg can reveal new free loose bodies. Another tip is to add a flush by temporarily increasing pressure of arthropump (Fig. 1.16).

When chondromas are bigger, mega-grasper is useful. Be careful that chondromas don't escape with a classical grasper. We can lose them into soft tissue between the capsula and skin. Some cases of secondary extra-capsular proliferation are described.

Therefore, enlarging the capsulotomy beside the portal with shaver, knife, or radiofrequency probe could facilitate the extraction of big loose bodies. You can even fragment large chondromas or ossified chondromas with a shaver or a burr before extracting them (Fig. 1.17).

1.3.2 Loose Body Location

You can find free loose bodies in peripheral compartment (most of the time) or in central compartment or both of them (Figs. 1.18 and 1.19).

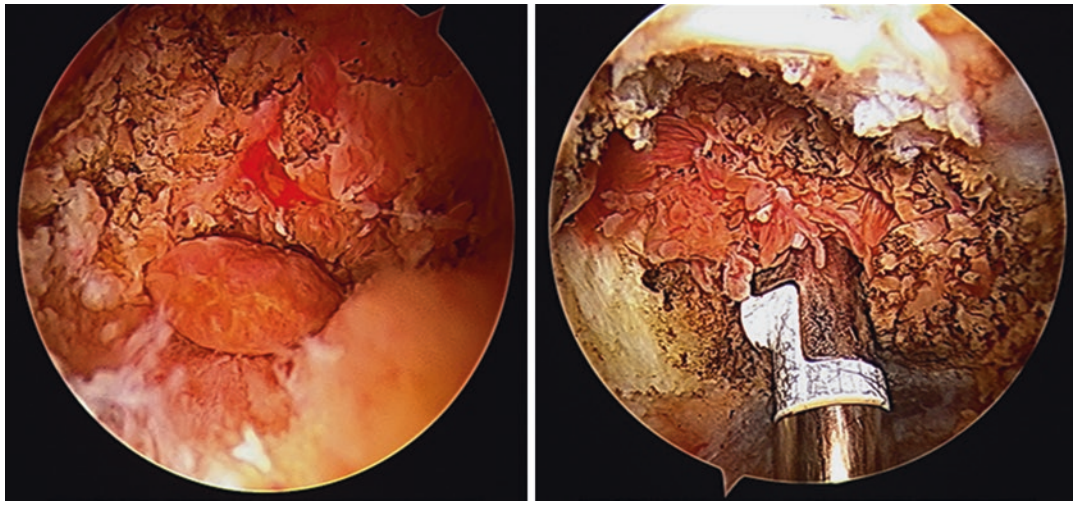

Fig. 1.9 Another diffuse form in peripheral compartment treated by electrocoagulation probe

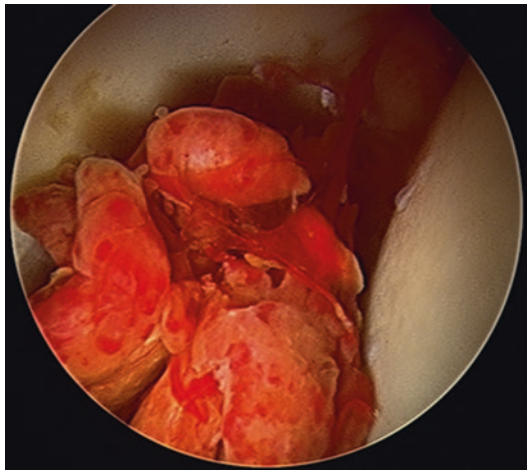

Fig. 1.10 A large villonodular synovitis in the central compartment filling acetabular fovea

1.3.3 Type of Chondromatosis

Chondromas can be declined in three categories: free foreign bodies, attached intra-synovial chondromas and integrated intra-synovial chondromas (Fig. 1.20).

Intra-synovial chondromas are challenging cases. Extracting all chondromas is difficult and requires total synovectomy. Access to embedded lesions is sometimes technically impossible (Fig. 1.21).

1.3.4 Managing the Peripheral Compartment

Catching free loose body could sometimes be difficult because chondromas move and can hide in capsular recessus. Doing a complete evaluation of the joint is important, particularly in the medial recessus and the posterior recessus (Fig. 1.22).

1.3.5 The Central Compartment (Fig. 1.23)

It is important to always screen all the central compartments to find free chondromas.

Do not hesitate to adapt your portal to have a better exposition of your chondromas (Figs. 1.24, 1.25, and 1.26).

Tips and Pearls for Loose Body Removal and Joint Lavage

How to find, catch, and extract free loose bodies?

- Move and shake your patient leg.
- Increase arthropump pressure temporarily.
- Switch portal and scope.
- Stop irrigating the joint before grasping.
- Large chondromas can be fragmented by a shaver or a burr.
- Enlarge the capsulotomy beside the portal to extract big chondromas.

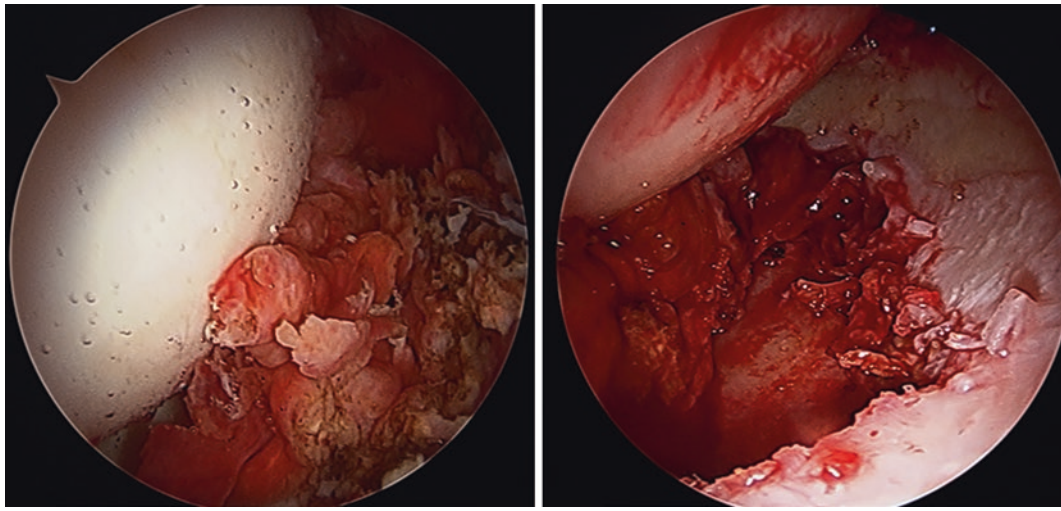

Fig. 1.11 Central compartment synovitis in fovea. Sometimes access to all parts of the fossa can be challenging even with curved instrument. Be careful not to create iatrogenic lesion on femoral head cartilage

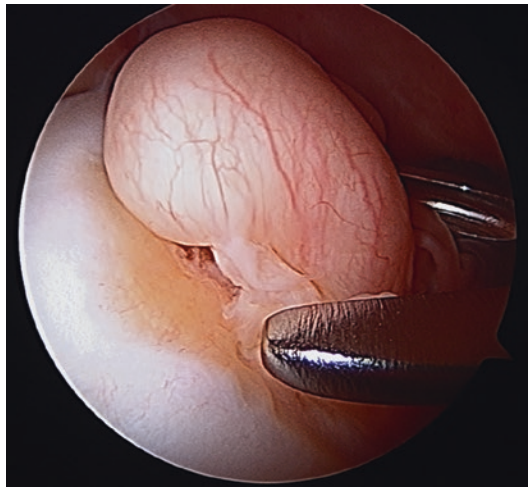

Fig. 1.12 A nodular form of villonodular synovitis in the peripheral compartment

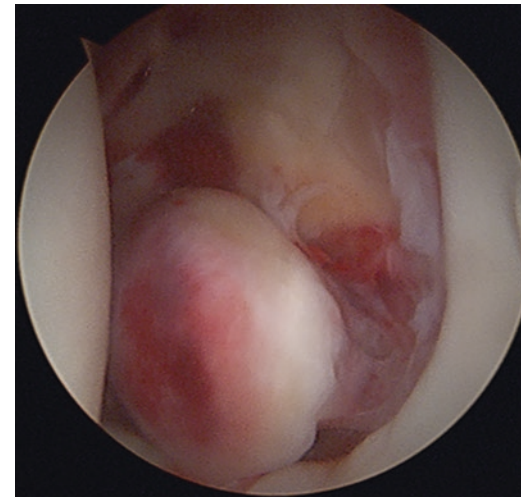

Fig. 1.13 Isolated villonodular nodule in the central compartment

Fig. 1.14 Free loose bodies on right hip artho-CT coronal view

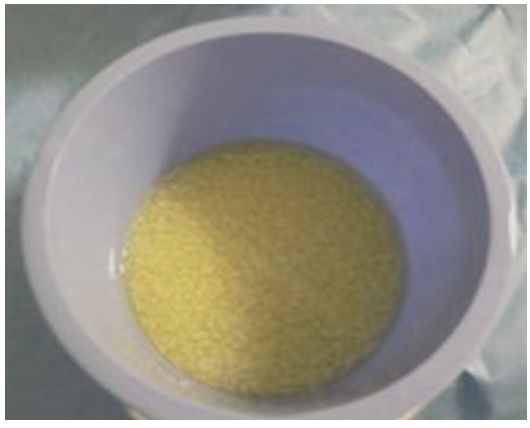

Fig. 1.15 Hundreds of free chondromas extracted by hip arthroscopy

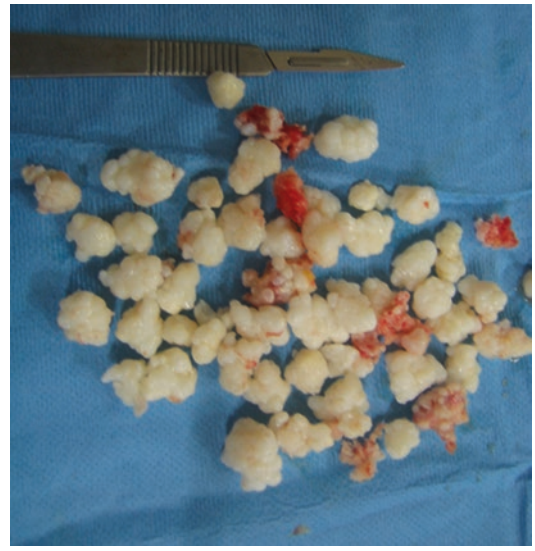

Fig. 1.16 Medium-sized chondromas

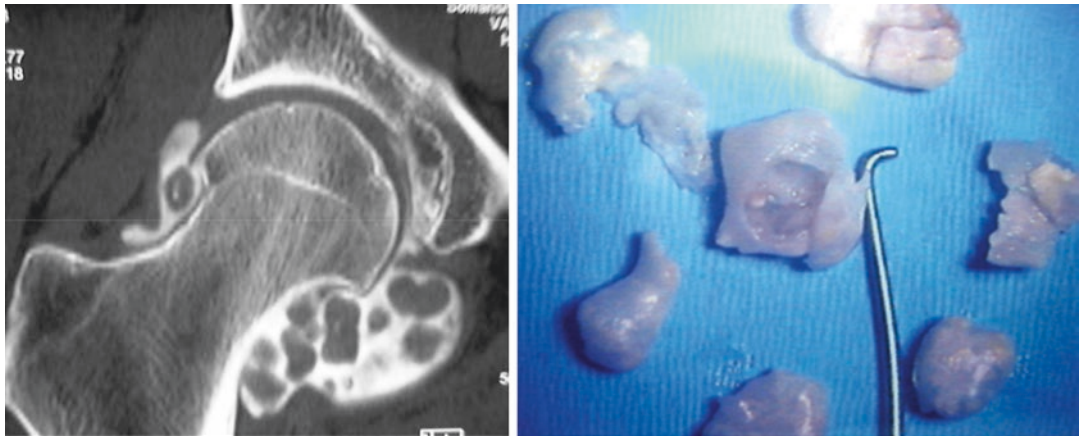

Fig. 1.17 Big-sized chondromas extracted by an arthroscopic procedure. It could be rational to consider an open arthrotomy for these difficult cases

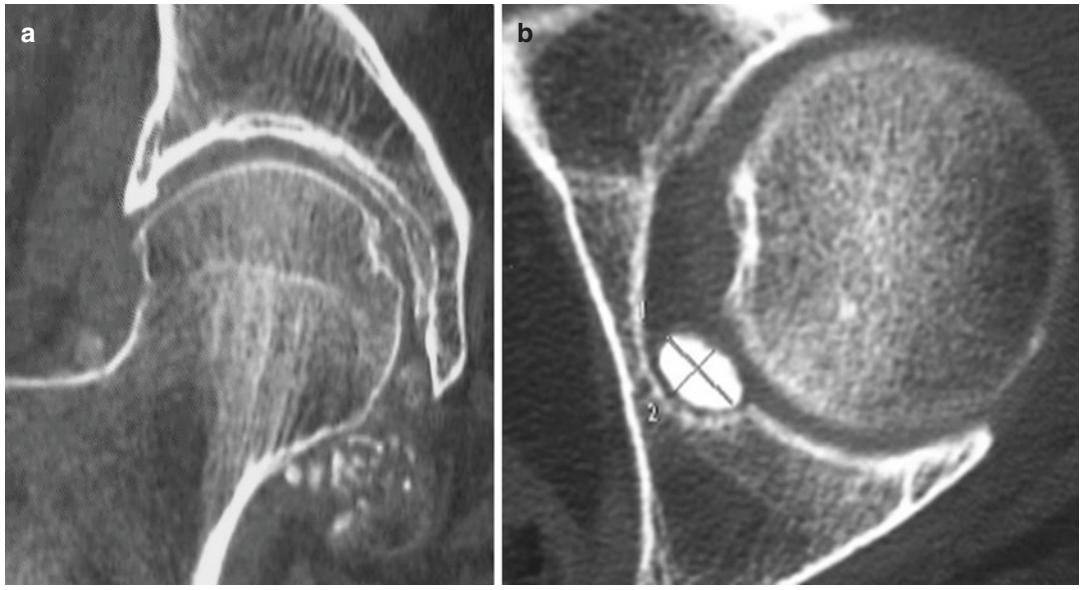

Fig. 1.18 (**a**) Multiple localizations of osteochondromas in peripheral compartment on coronal TDM view. (**b**) Unique ossified chondroma in acetabular fossa on axial TDM view

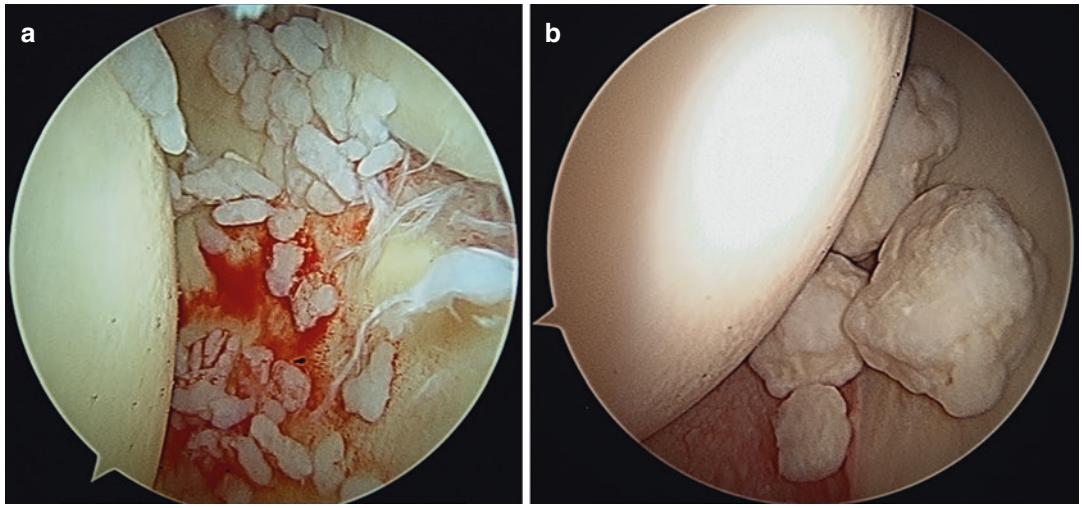

Fig. 1.19 (**a**) Multiple chondromas in fovea on arthroscopic view. (**b**) Four free loose bodies localize in the central compartment near the posterior acetabular rim

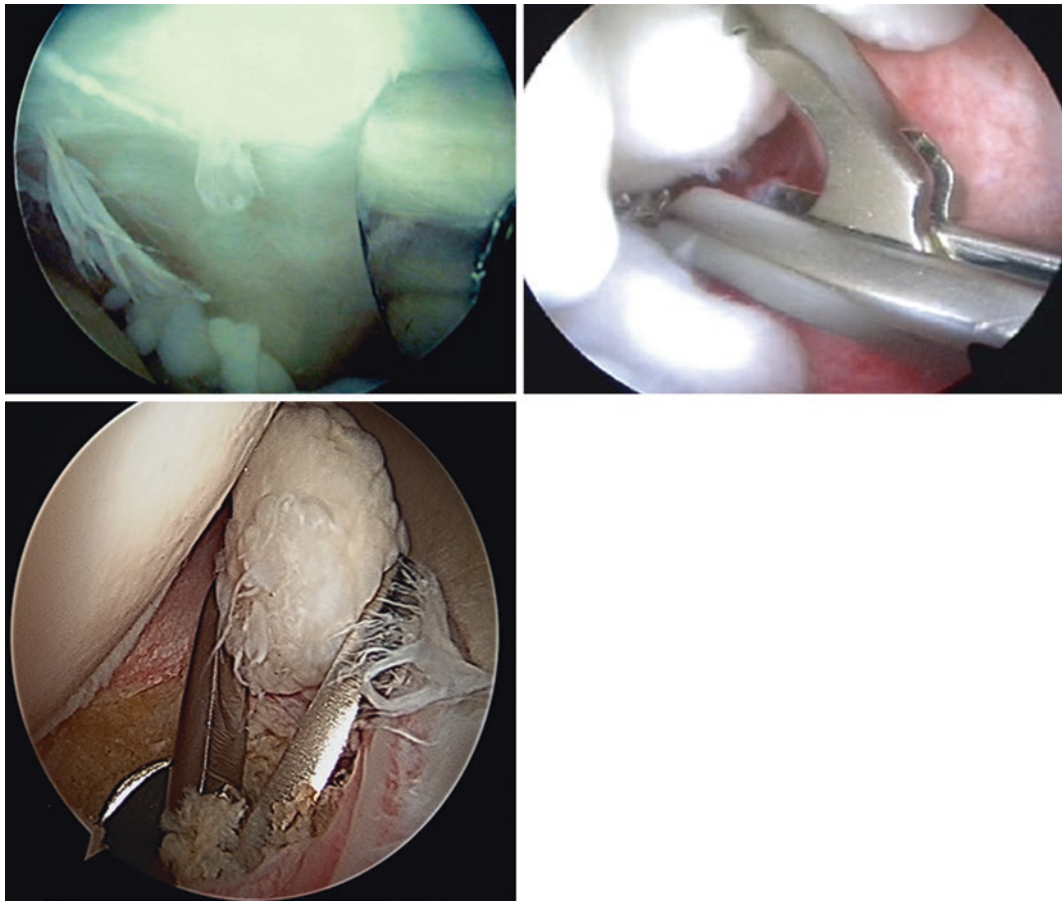

Fig. 1.20 Free chondromas are quite easy to extract with suction and different sizes of cannulas or grasper

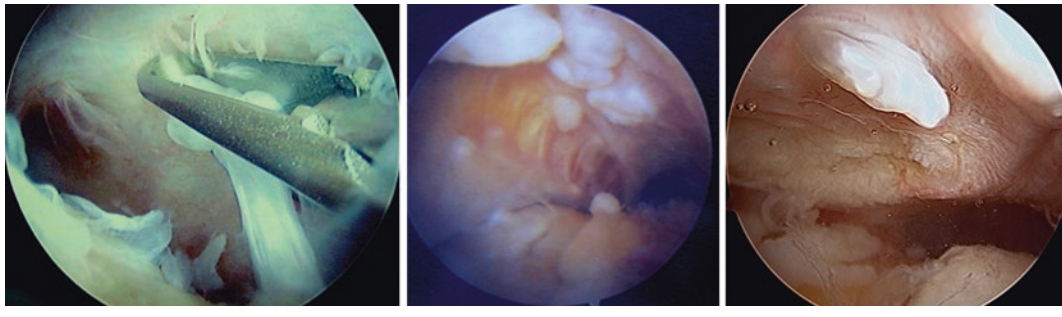

Fig. 1.21 Intra-synovial chondromas (attached and embedded)

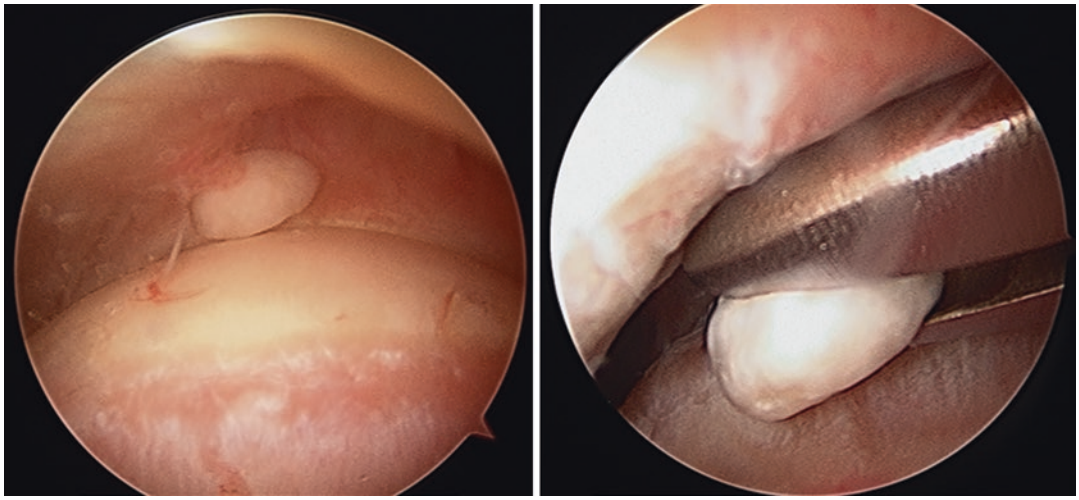

Fig. 1.22 You can stop irrigating the joint when you arrive with your grasper. It can facilitate grasping procedure

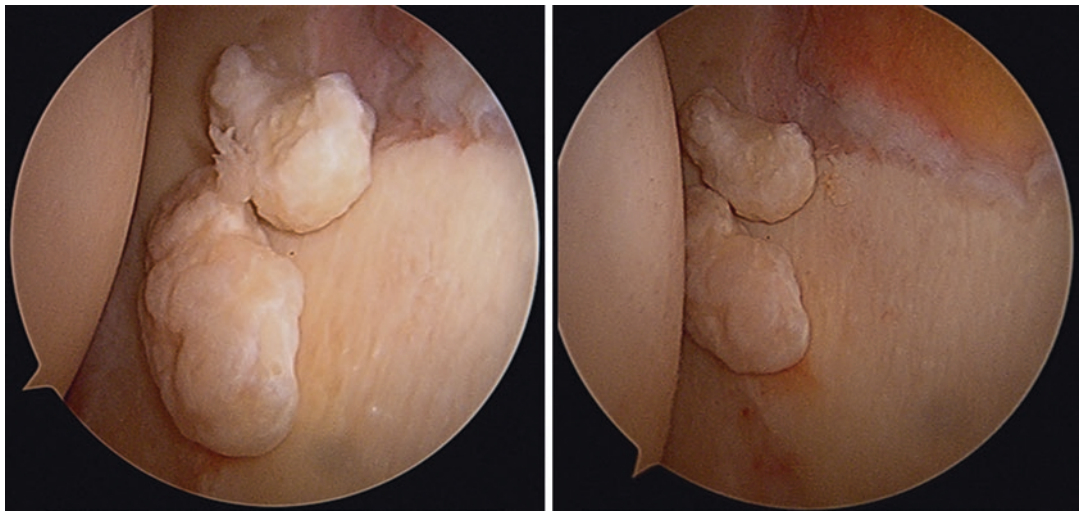

Fig. 1.23 Most of the time chondromas are waiting near the posterior acetabulum rim

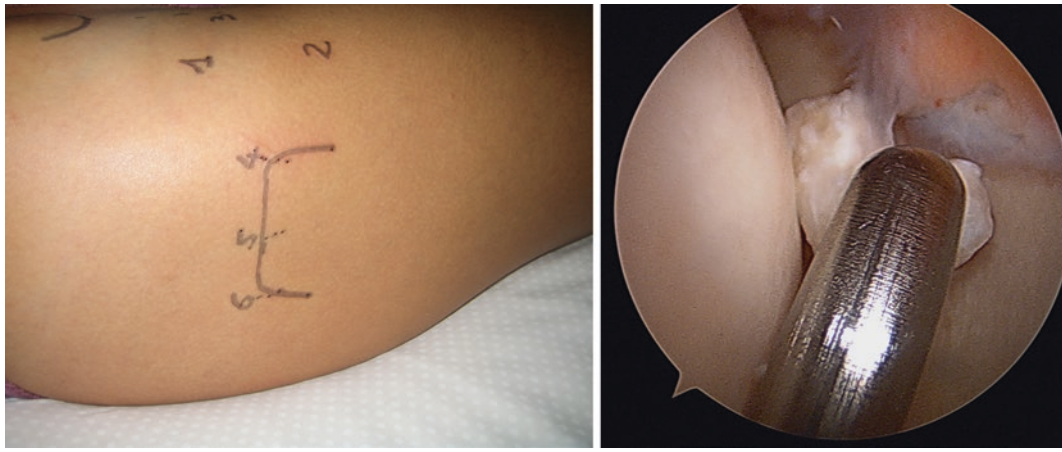

Fig. 1.24 For this posterior chondroma in the central compartment, performing an instrumental number 5 or 6 portal facilitated access to chondromas without risk of cartilage injury

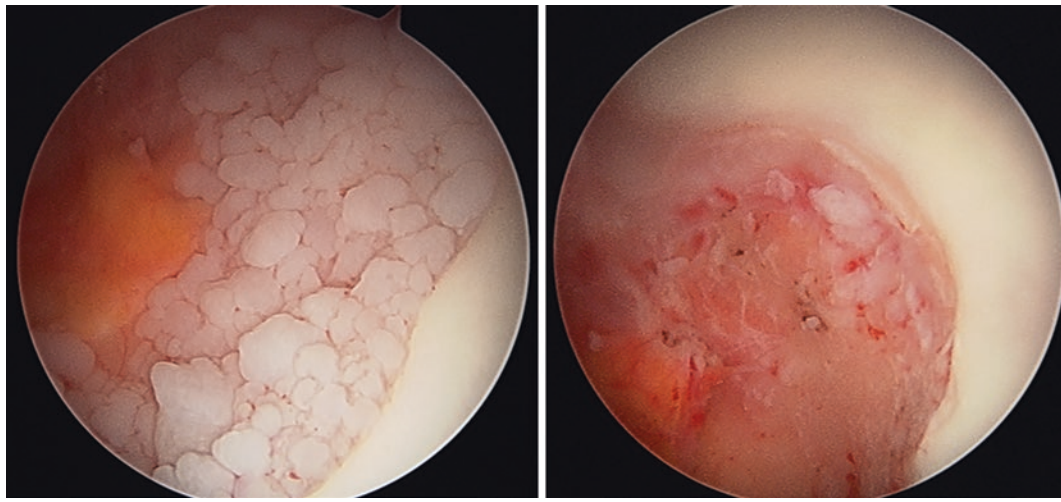

Fig. 1.25 A case of lots of chondromas waiting in the acetabular fovea (before and after extraction)

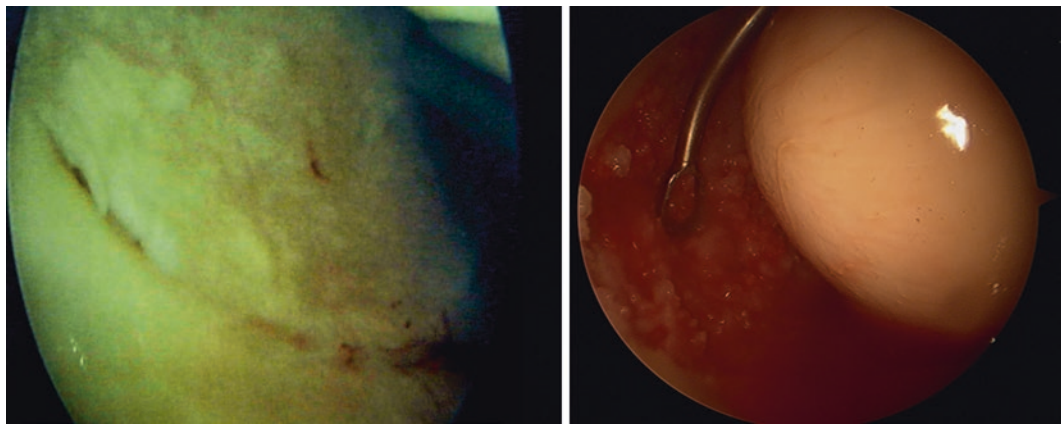

Fig. 1.26 Chondromas in the fovea can be hard to extract if they are not free. In case they agglutinate, they can form a "pancake." Using curved "curette" can help

References

1. Friedman B, et al. Case report 439: synovial chondromatosis (osteochondromatosis) of the right hip: "hidden" radiologic manifestations. Skelet Radiol. 1987;16(6):504–8.
2. van der Valk MR, et al. Synovial chondromatosis of the hip, a case report and literature review. J Orthop. 2019;16(3):249–53.
3. Startzman A, Collins D, Carreira D. A systematic literature review of synovial chondromatosis and pigmented villonodular synovitis of the hip. Phys Sportsmed. 2016;44(4):425–31.
4. Xie GP, et al. Pigmented villonodular synovitis: a retrospective multicenter study of 237 cases. PLoS One. 2015;10(3):e0121451.
5. Schwartz HS, Unni KK, Pritchard DJ. Pigmented villonodular synovitis. A retrospective review of affected large joints. Clin Orthop Relat Res. 1989;247:243–55.
6. Flipo RM, et al. [Pigmented villonodular synovitis of the hip. Results of a national survey apropos of 58 cases]. Rev Rhum Ed Fr. 1994;61(2):85–95.
7. Knoeller SM. Synovial osteochondromatosis of the hip joint. Etiology, diagnostic investigation and therapy. Acta Orthop Belg. 2001;67(3):201–10.
8. Tibbo ME, et al. Long-term outcome of hip arthroplasty in the setting of synovial chondromatosis. J Arthroplast. 2018;33(7):2173–6.
9. Levy DM, et al. Pigmented villonodular synovitis of the hip: a systematic review. Am J Orthop (Belle Mead NJ). 2016;45(1):23–8.
10. Steinmetz S, Rougemont AL, Peter R. Pigmented villonodular synovitis of the hip. EFORT Open Rev. 2016;1(6):260–6.
11. Gonzalez Della Valle A, et al. Pigmented villonodular synovitis of the hip: 2- to 23-year followup study. Clin Orthop Relat Res. 2001;388:187–99.
12. Ellsworth B, Kamath AF. Open and arthroscopic with mini-open surgical hip approaches for treatment of pigmented villonodular synovitis and concomitant hip pathology. Case Rep Orthop. 2017;2017:3716360.
13. Gondolph-Zink B, Puhl W, Noack W. Semiarthroscopic synovectomy of the hip. Int Orthop. 1988;12(1):31–5.
14. Sekiya JK, et al. Hip arthroscopy using a limited anterior exposure: an alternative approach for arthroscopic access. Arthroscopy. 2000;16(1):16–20.
15. Byrd JW. Hip arthroscopy by the supine approach. Instr Course Lect. 2006;55:325–36.
16. Glick JM. Hip arthroscopy by the lateral approach. Instr Course Lect. 2006;55:317–23.
17. Nogier A, Boyer T, Khan MT. Hip arthroscopy: less invasive technique. Arthrosc Tech. 2014;3(1):e101–6.
18. Dienst M, et al. Hip arthroscopy without traction: in vivo anatomy of the peripheral hip joint cavity. Arthroscopy. 2001;17(9):924–31.
19. Blitzer CM, Scarano KA. Arthroscopic management of synovial osteochondromatosis of the hip. Orthopedics. 2015;38(6):e536–8.
20. Myers BW, Masi AT. Pigmented villonodular synovitis and tenosynovitis: a clinical epidemiologic study of 166 cases and literature review. Medicine (Baltimore). 1980;59(3):223–38.
21. Spanier D, Harrast M. Pigmented villonodular synovitis: an uncommon presentation of anterior hip pain. Am J Phys Med Rehabil. 2005;84(2):131–5.
22. Dorfmann H, Boyer T. Arthroscopy of the hip: 12 years of experience. Arthroscopy. 1999;15(1):67–72.
23. Godde S, Kusma M, Dienst M. [Synovial disorders and loose bodies in the hip joint. Arthroscopic diagnostics and treatment]. Orthopade. 2006; 35(1):67–76.
24. Janssens X, et al. Diagnostic arthroscopy of the hip joint in pigmented villonodular synovitis. Arthroscopy. 1987;3(4):283–7.
25. Krebs VE. The role of hip arthroscopy in the treatment of synovial disorders and loose bodies. Clin Orthop Relat Res. 2003;406:48–59.
26. Sim FH. Synovial proliferative disorders: role of synovectomy. Arthroscopy. 1985;1(3):198–204.
27. Lee S, et al. Arthroscopic technique for the treatment of pigmented villonodular synovitis of the hip. Arthrosc Tech. 2015;4(1):e41–6.
28. Byrd JW, Jones KS, Maiers GP 2nd. Two to 10 Years' follow-up of arthroscopic management of pigmented villonodular synovitis in the hip: a case series. Arthroscopy. 2013;29(11):1783–7.
29. Zini R, et al. Arthroscopic management of primary synovial chondromatosis of the hip. Arthroscopy. 2013;29(3):420–6.
30. Boyer T, Dorfmann H. Arthroscopy in primary synovial chondromatosis of the hip: description and outcome of treatment. J Bone Joint Surg Br. 2008;90(3):314–8.
31. Ferro FP, Philippon MJ. Arthroscopy provides symptom relief and good functional outcomes in patients with hip synovial chondromatosis. J Hip Preserv Surg. 2015;2(3):265–71.

2 Painful Hip Arthroplasty Assessment: Removal of Cement or Loose Bodies

Oliver Marin-Peña, Rohit Lamba, Antonio A. Guimarães Barros, Dinesh Choudary, and Carlomagno Cardenas Nylander

2.1 Introduction

Traditional indications for hip arthroscopy are in the field of hip preservation surgery [1–3], but recently its use has been proposed in patients who have hip replacement (total hip arthroplasty [THA], hemiarthroplasty, or hip resurfacing). The concept of arthroscopy in a patient with joint replacement is not new [4], and had been used in patients with a painful knee and shoulder arthroplasties [5–9].

O. Marin-Peña (✉)
Hip Unit, Orthopedic and Traumatology Department, Hospital Universitario Infanta Leonor, Madrid, Spain

R. Lamba
Department of Orthopaedics, W-Pratiksha Hospital, Gurgaon, India

A. A. Guimarães Barros
Department of Orthopaedics, Hospital Madre Teresa, Belo Horizonte, Brazil

D. Choudary
Department of Orthopaedics, Apollo Hospitals, Chennai, India

C. Cardenas Nylander
Department of Orthopedic Surgery and Traumatology, ICATME-Hospital Universitari Dexeus, Barcelona, Spain

2.2 The Painful Joint Replacement

Despite its good results, groin pain after THA has been evaluated between 0.4 and 8.3% [10, 11]. Hip arthroscopy might be useful in both diagnosis and treatment of problems related to THA (Fig. 2.1), but its usefulness should not be overemphasized.

Groin pain after total hip arthroplasty has a prevalence ranging from 0.4 to 18.3% [12]. Usefulness of hip arthroscopy as a tool in groin pain after hip replacement should be based on a previous investigation of the causes of groin pain in these patients. With increase in number of total hip arthroplasties in young age group and increasing life expectancy, the number of patients with unexplained pain in a clinically and radiological sound hip is set to rise as well.

We could divide causes of groin pain after hip replacement as extrinsic and intrinsic [13] (Table 2.1).

Initially, individualized protocol (including physical exams, lab tests, imaging studies, joint aspiration) should be performed to rule out all these diagnostic options. Nevertheless, some patients with equivocal results of these investigations are classified as "diagnostic dilemma." Arthroscopy could be indicated in such patients as a diagnostic tool and, eventually, a pain-relieving method. However, most cases of painful hip replacement require open revision arthroplasty surgery.

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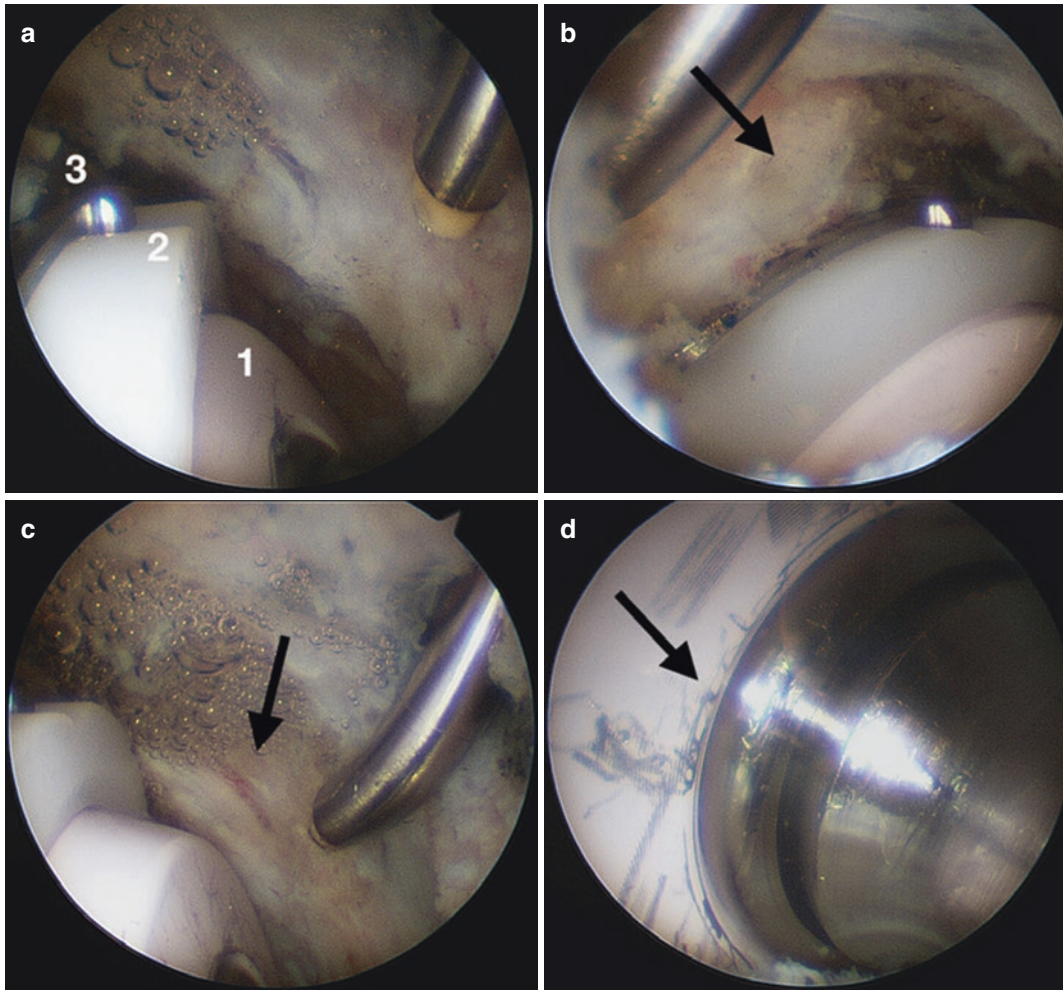

Fig. 2.1 Assessment of a painful THA. (**a**) Visualization of the polyethylene liner locking mechanism and metal back (1–3). (**b**) Checking impingement between bone acetabulum and implant. (**c**) Psoas redness. (**d**) Checking the femoral head and taper of the stem

Table 2.1 Etiologies of painful hip replacement

Extrinsic causes	Intrinsic causes
Great trochanter pain syndrome	THA infection
Local neurological/vascular pathology	Aseptic loosening
Heterotopic ossification	Iliopsoas tendonitis
Inguinal hernia	Impingement
Metastatic cancer	Synovitis metal/polyethylene debris
Spinal pathology and radiculopathy	Pelvic osteolysis
	Occult acetabular or pelvic fracture

2.3 Indications for Hip Arthroscopy in THA

Hip arthroscopy allows good visualization of the component surfaces, the adjacent synovium, and the surrounding soft-tissue structures (Iliopsoas tendon, reflected head of rectus femoris tendon, and hip capsule). Arthroscopy also enables dynamic assessment of hip anatomy and motion,

Table 2.2 Frequent indications of hip arthroscopy in painful hip replacement and its role in these pathologies

Hip arthroscopy indication	Role of hip arthroscopy
Psoas tendinopathy	Psoas release
Unknown painful hip replacement	Diagnosis and treatment
Periprosthetic THA infection	Diagnosis and treatment
Great trochanter pain syndrome	Debridement/tendon repair
Intra-articular bodies	Removal
Adhesions	Debridement
Chronic synovitis	Debridement/biopsy
Bone spur acetabulum or neck	Resection
Wear, component loosening	Diagnosis/dynamic assessment

allowing the surgeon to assess subtle residual impingement or component loosening.

Principal indications of hip arthroscopy affecting THA are well described in current literature [14–17] (Table 2.2).

In a systematic review, authors concluded that hip arthroscopy could be a safe and effective method to treat hip arthroplasty patients with iliopsoas tendinopathy and as a diagnostic tool for painful hip arthroplasty with no obvious diagnosis. Iliopsoas tendinopathy was the main indication (35.8%) followed by unknown painful THA (24.6%), periprosthetic infection (6.4%), and intra-articular loose bodies (3.5%) [18]. Several small individual series described hip arthroscopy as a useful tool after painful THA. Diagnostic proposal was described in 11 out of 16 cases in one series [19]. After hip arthroscopy was done, 9 out of 11 had synovitis and scar tissue that was debrided and 2 underwent open surgery for THA revision. Overall, arthroscopy effectively treated 8 out of 12 cases presenting as diagnostic dilemmas. In another publication, soft-tissue release was performed in 11 patients (iliopsoas tenotomy and debridement scar tissue). At 2 years, better results were detected in patients with arthroscopic iliopsoas tenotomy [20]. In a report of five patients with painful THA, two patients presented THA infection, two cases psoas tenotomy, and in two subjects with synovitis and adhesions a debridement was done [21].

In a large study over 24 painful hip replacements, preoperative provisional diagnoses were reached in 12 patients. Arthroscopy led to correction of the diagnosis in 4 of these 12 patients. In 12 patients who lacked a provisional diagnosis, hip arthroscopy established a diagnosis in 11. Overall, arthroscopy led to a new or corrected diagnosis in 15 of the 24 patients. They concluded that hip arthroscopy in a patient who remains symptomatic following joint replacement can be undertaken safely [14].

2.4 Surgical Technique

Regarding surgical technique, steps of arthroscopy in total hip replacement are similar to conventional hip arthroscopy. However, the use of traction is a matter of debate and it is unclear how much traction to use, at what position, and what is the safe time for traction (Fig. 2.2).

The portals are similar to traditional portals and are performed according to the surgeon preference. First portal, usually anterolateral, should be performed under fluoroscopy guidance to avoid prosthesis damage. Second portal is then constructed with direct visualization after connection of irrigation system (Fig. 2.3).

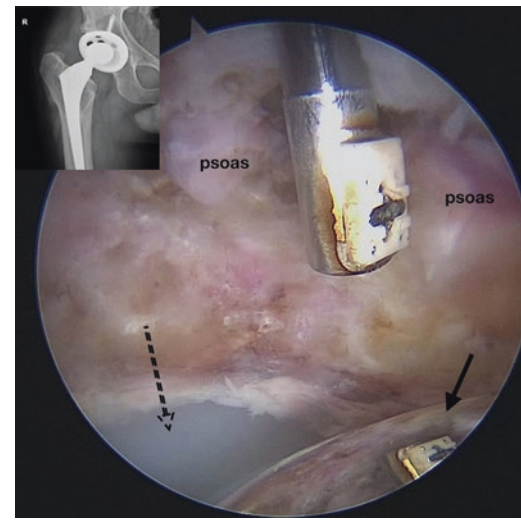

Fig. 2.2 Slight traction should be used to evaluate metallic femoral head (black arrow) and polyethylene liner (slotted arrow)