Cystoscopy as a tool for hip arthroscopy for treating morbidly obese patients: a case report of treating a Sumo wrestler

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ABSTRACT
Sports medicine surgeons sometimes encounter morbidly obese athletes with femoroacetabular impingement, such as Sumo wrestlers. In such cases, traditional arthroscopic equipment will not reach the joint. This case report describes the use of a cystoscope to perform arthroscopy to treat borderline developmental dysplasia of the hip combined with cam impingement in a morbidly obese athlete. The cystoscope enables hip arthroscopy to be performed when traditional instruments are not of sufficient length to access the hip and/or an extra-long arthroscope is not available. The use of the cystoscope provides a practical, feasible and minimally invasive option to treat non-arthritic intraarticular hip pathology in the morbidly obese or extremely muscular athletes.

INTRODUCTION
Hip arthroscopy has been established as a viable, less invasive alternative to open surgical dislocation for patients with different non-arthritic hip conditions. Safe successful outcomes have been reported in symptomatic patients with femoroacetabular impingement (FAI) syndrome and borderline dysplasia with concurrent chondrolabral pathology [1–3]. Some patients may be morbidly obese or may be athletes who are extremely muscular.

Sumo is the official national sport of Japan. The average weight of competitors is around 140 kg. To win, a competitor must push their opponent outside a circle or knock them down. Sumo wrestling is recognized as a collision sport requiring agility and involving sudden multidirectional high-load impact movements, often in hip flexion and competitors are at risk for painful non-arthritic intraarticular hip conditions that may adversely affect continued athletic performance as well as daily activities. The large size and musculature of these athletic patients present technical challenges. However, the current literature does not provide clear recommendations on how to perform hip arthroscopy on Sumo wrestlers presenting with non-arthritic hip pathology. The purpose of this article was to present a case report with lessons learned to provide further knowledge to aid future arthroscopic treatment of this unique type of athlete.

CASE
A 31-year-old male professional Sumo wrestler presented with right hip pain associated with a limited range of motion (ROM). His height was 190 cm, and his weight was 200 kg (body mass index [BMI] 55.4 kg/m²). Physical examination revealed a positive flexion adduction internal rotation test, flexion abduction external rotation test and dial test. The lateral center-edge angle was 19°, and the Sharp angle was 46° with a double floor at the bottom of the acetabular fossa, increased tear-drop distance, and a pistol grip deformity on the well-centered anteroposterior...
(AP) pelvis radiograph (Fig. 1A). A false profile view revealed that the vertical center anterior angle was 16° (Fig. 1B). A modified Dunn view revealed that the alpha angle was 87°, suggesting cam morphology (Fig. 1C). Three-dimensional computed tomography scan revealed an anterior inferior iliac spine (AIIS) morphology and a cam lesion (Fig. 1D). On magnetic resonance imaging (MRI), a T2-weighted coronal view demonstrated a high signal intensity area in the anterosuperior labrum (Fig. 1E). Proton-density fat suppression coronal view on MRI revealed increased cartilage width (Fig. 1F), and T2 mapping showed an increasing T2 value, suggesting articular cartilage damage.

**SURGICAL TECHNIQUE**

Hip arthroscopy was performed in the supine position on a traction table under general anesthesia. It was impossible to use the usual traction table because this patient’s body weight exceeded the manufacturer’s safe limits for the equipment. Thus, a special traction table (Hana table, Mizuho OSI, Ahem Avenue Union City, CA, USA) with a maximum load of 223 kg was utilized (Fig. 2A). Since the distance measured from the skin to the hip joint capsule in this patient was over 20 cm, we utilized a rigid (non-flexible) cystoscope, which is longer than a regular arthroscope (Fig. 2B).

An anterolateral portal (ALP), mid-anterior portal (MAP) and proximal mid-anterior portal (PMAP) were established. After traction was applied, a longer cannulated needle (Smith and Nephew, Andover, MA, USA) was inserted into the joint through the ALP under fluoroscopic guidance. Subsequently, a guidewire was introduced through the needle, followed by the insertion of a cannulated switching rod. The sheath of cystoscope was slid into the joint over the switching rod, and then the cystoscope was then introduced into the central hip compartment

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**Fig. 1.** Preoperative imaging: (A) preoperative anteroposterior (AP) radiograph of a right hip showing a non-dysplastic acetabulum, joint space narrowing and a pistol grip deformity. The lateral center-edge angle was 19°, Sharp angle was 46°; (B) preoperative false profile view of a right hip showing reduced anterior acetabular coverage. The vertical center anterior angle was 17°. (C) Preoperative modified Dunn view of a right hip showing that the alpha angle was 87°, and the offset ratio was 0.01, suggesting cam morphology. (D) Three-dimensional computed tomography scan of the right hip showing coverage of the acetabulum and a type II anterior inferior iliac spine (AIIS). (E) Three-dimensional computed tomography of the right hip showing cam morphology. (F) T2-weighted coronal magnetic resonance image (MRI) scan showing a high-intensity signal at the anterior-superior labrum. (G) T2-weighted oblique-axial MRI scan showing a high-intensity signal at the anterior-superior labrum. (H) Proton-density fat suppression MRI scan showing partial chondral thinning.
through the anterolateral portal (Fig. 2B). After inter-
portal capsulotomy, an intra-articular evaluation was per-
formed. A detached tear of the acetabular labrum at
2:30–12:00 o’clock positions, with adjacent cartilage
damage, was observed at the anterosuperior aspect of the
acetabulum (Fig. 3A). A prominent AIIS was observed
adjacent to a torn anterosuperior labrum. Sub-spine de-
compression was performed using a motorized round burr
(Smith and Nephew) (Fig. 3B). Labral fixation with suture
anchors (PushLock, Arthrex, Naples, FL, USA; SutureFix,
Smith and Nephew) was performed (Fig. 3C).
Microfracture chondroplasty was performed for acetabular
cartilage damage (Fig. 3D). After the controlled release of
traction with subsequent confirmation of the perimetric la-
bral fluid seal, the peripheral compartment was assessed,
and cam osteoplasty was performed (Fig. 3E). Finally,
shoelace capsular closure with non-absorbable sutures
(Ultratape; Smith and Nephew) was performed (Fig. 3F)
[4]. A post-operative X-ray showed improved femoral head
and neck offset (Fig. 4A and B).

**POST-OPERATIVE REHABILITATION PROTOCOL**

Although microfracture was performed, weight-bearing
with dual crutches was permitted as tolerated. Passive
ROM exercises were initiated during the first week by
physical therapists. Circumduction ROM was performed
for 3 weeks to minimize adhesive capsulitis and capsulola-
bral adhesions. Stationary bike activity was initiated
2 weeks after surgery. The patient was allowed to advance
his physical activity after achieving maximum ROM and
a stable gait. Modified Harris Hip Score, Vail Hip Score,
and iHot-12 score had improved 2 years after surgery
compared with preoperatively (modified Harris
Hip Score: 67.1–93.5, Vail Hip Score: 28–86, iHot-12:
40.8–92.5). This patient returned to his preinjury activity
level 1 year after surgery, but ultimately retired from pro-
fessional Sumo wrestling and became a stable master.

**DISCUSSION**

This case report describes an arthroscopic approach for
treating a morbidly obese athletic patient with recalcitrant
non-arthritic hip pathology using a cystoscope. In general,
hip arthroscopy for obese patients can offer clinical ben-
efits. Collins et al. reported in a series of 21 consecutive
obese patients and 18 non-obese patients that there was no
significant difference in patient-reported outcome (PRO)
scores, but obese patients had an increased risk of compli-
cations [5]. Gupta et al. reported, in a series of 62 consecu-
tive obese patients and 124 non-obese patients, that there
was no significant difference in PRO scores, but the rate of
conversion to total hip arthroplasty (THA) and the revi-
sion rate were significantly higher in the obese group [6].
In addition, Perets et al. reported, in a series of 74 consecu-
tive obese patients and 74 non-obese patients, that there
was no significant difference in PRO scores, but the rate of
conversion to THA was significantly higher in the obese
group at a minimum 5-year follow-up [7]. A recent system-
atic review has reported a higher rate of revision surgery
and lower PRO scores in obese patients than in the non-
obese patients [8]. Obesity in these reports was defined as
a BMI >30 kg/m², and to our knowledge, there was
little reference to arthroscopic hip surgery management for
morbidly obese (BMI ≥40 kg/m²) patients in the setting
of FAI.

Commercially produced rigid cystoscopes are typically
30 cm in length and are available in the following sheath
dimensions: 17-French gauge (5.7-mm diameter),
19-French gauge (6.3-mm diameter) and 22-French gauge (7.3-mm diameter). Hence, a slightly longer skin incision for the viewing portal than that is used for the standard arthroscope may be required. Most patients undergoing hip arthroscopy have a skin to socket distance at the 12 and 3 o’clock positions of 11 cm or less, thus enabling the use of standard-length arthroscopes, such as those used in knee and shoulder arthroscopy [9]. One of our co-authors [D.K.M.] has used a standard-length arthroscope in the setting of very obese or muscular patients by extending the incision to enable antegrade placement of the arthroscope bridge into the subcutaneous tissue of the anterolateral-

**Fig. 3.** (A) Arthroscopic findings from the anterolateral portal in the right hip showing a complete labral tear and acetabular chondral damage classified as International Cartilage Repair Society grade 4 (arrows). (B) Arthroscopic view from the anterolateral portal in the right hip showing anterior inferior iliac spine decompression. (C) Arthroscopic view from the anterolateral portal in the right hip showing labral repair with suture anchors. (D) Arthroscopic view from anterolateral portal in the right hip showing microfracture chondroplasty for acetabular cartilage damage. (E) Peripheral compartment view from the mid-anterior portal of the right hip showing cam osteochondroplasty. (F) Endoscopic extra-articular view from the anterolateral portal in the right hip showing shoelace capsular closure (AC, acetabulum; AIIS, anterior inferior iliac spine; CP, capsule; FH, femoral head; L, labrum).

**Fig. 4.** Post-operative AP radiograph of the right hip showing improved femoral head neck offset of the pistol grip deformity (A) and post-operative modified Dunn view showing improved femoral head neck offset (B).
viewing portal. However, he cautions that this technique typically gains ~3–4 cm of further excursion to access the central compartment. The standard arthroscopy telescope length is ~16 cm in length. An extra-long arthroscope (Smith and Nephew) is commercially available with a working length of 20 cm. Hence, the cystoscope enables hip arthroscopy to be performed when other options provide insufficient length to access the hip and/or an extra-long arthroscope is not available. Most hip arthroscopies are performed with a standard-length arthroscope with viewing angles of 70° and 30°. Commercially available cystoscopes offer 0°–120° viewing angles but are also available with more familiar viewing angles of 70° and 30° for hip arthroscopy.

The pitfalls of using a cystoscope are described as follows. It takes a long time for surgeons to adjust to handling a cystoscope owing to its longer length. The standard arthroscopy hip cannula set does not facilitate cystoscope insertion. However, the cystoscope can connect to a standard arthroscopic camera system and light cable. The cystoscope sheath can connect to the inflow/outflow tube set (Smith and Nephew) for typical fluid management via arthroscopic pump or gravity fluid management.

This surgical technique has several advantages and disadvantages, as summarized in Table I. In general, open treatment of FAI showed good clinical outcomes [10, 11]. However, in the case of morbidly obese patients, it appears to be difficult to obtain a clear surgical view by open surgical hip dislocation owing to thicker subcutaneous tissue [8]. Cystoscopic visualization may contribute to a relatively shorter surgical time and to reduce the occurrence of complications. In addition, less invasive treatment by this arthroscopic technique may enable an earlier return to sports activities. Surgical pearls and pitfalls for this technique are detailed in Table II.

In obese patients, there is an increasing risk of potential complications (e.g. pressure ulcer and wound healing problems, infection and deep vein thrombosis) from arthroscopic surgery [12, 13]. Thus, valid indications for hip arthroscopic surgery and detailed informed consent should be commensurate with the increasing risks of these complications.

Long-term clinical and radiographic outcomes from multiple cases will be required to substantiate the benefits of this procedure because the risk of conversion to THA in obese patients is significantly higher than that in non-obese patients. However, this technique offers a less invasive alternative for morbidly obese patients. Moreover, these techniques may find applicability in the arthroscopic treatment of very muscular non-obese patients exhibiting compromising hip pathology.

| Table I. Advantages and disadvantages of hip arthroscopic surgery in the morbidly obese patient compared with open surgical dislocation |
|---------------------------------------------------------------|
| **Advantages**                                                                 | **Disadvantages**                                  |
| • Minimally invasive                                            | • Technically demanding                            |
| • No trochanteric non-union or hardware-related problems        | • Cystoscope required                              |
| Clear surgical view                                            | Complications from excessive traction              |
| Early rehabilitation                                           | • Quick recovery                                   |
| • Quick recovery                                                | • Improved cosmesis                                |

| Table II. Pearls and pitfalls                                  |
|---------------------------------------------------------------|
| **Pearls**                                                                 | **Pitfalls**                                      |
| Preoperative evaluation and planning with radiographic image examination are indispensable. | Difficulty of using cystoscopy instead of arthroscopy. |
| Use traction table supportive of increased patient body weight. |                                                                 |
| Use the cystoscope instead of arthroscopy.                    |                                                                 |

**CONCLUSION**

The use of the cystoscope provides a practical, feasible and minimally invasive option to treat non-arthritic intra-articular hip pathology in the morbidly obese or extremely muscular athletes.

**AUTHORS’ CONTRIBUTIONS**

Authors have contributed as follows: S.U. and H.N. had the major role in elaborating the plan, formulating this manuscript and interpreting the data. A.S., Y.Y. and D.M. contributed in data collection, formulating the plans and writing this manuscript.

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REFERENCES
1. Arashi T, Murata Y, Utsunomiya H et al. Higher risk of cam re-growth in adolescents undergoing arthroscopic femoroacetabular impingement correction: a retrospective comparison of 33 adolescent and 74 adults. Acta Orthop 2019; 90: 547–53.
2. Murata Y, Uchida S, Utsunomiya H et al. A comparison of clinical outcome between athletes and non-athletes undergoing hip arthroscopy for femoroacetabular impingement. Clin J Sport Med 2017; 27: 349–56.
3. Hatakeyama A, Utsunomiya H, Nishikino S et al. Predictors of poor clinical outcome after arthroscopic labral preservation, capsular plication, and cam osteoplasty in the setting of borderline hip dysplasia. Am J Sports Med 2018; 46: 135–43.
4. Uchida S, Pascual-Garrido C, Ohnishi Y et al. Arthroscopic shoelace capsular closure technique in the hip using ultratape. Arthrosc Tech 2017; 6: e157–61.
5. Collins JA, Beutel BG, Garofolo G, Youm T. Correlation of obesity with patient-reported outcomes and complications after hip arthroscopy. Arthroscopy 2015; 31: 57–62.
6. Gupta A, Redmond JM, Hammarstedt JE et al. Does obesity affect outcomes in hip arthroscopy? A matched-pair controlled study with minimum 2-year follow-up. Am J Sports Med 2015; 43: 965–71.
7. Perets I, Rybalko D, Chaharbakhshi EO et al. Minimum five-year outcomes of hip arthroscopy for the treatment of femoroacetabular impingement and labral tears in patients with obesity: a match-controlled study. J Bone Joint Surg Am 2018; 100: 965–73.
8. Bech NH, Kodde IF, Dusseldorp F et al. Hip arthroscopy in obese, a successful combination? J Hip Preserv Surg 2016; 3: 37–42.
9. Pascual-Garrido C, McConkey MO, Young DA et al. Can hip arthroscopy be performed with conventional knee-length instrumentation? Arthroscopy 2014; 30: 1588–94.
10. Nwachukwu BU, Fields K, Chang B et al. Preoperative outcome scores are predictive of achieving the minimal clinically important difference after arthroscopic treatment of femoroacetabular impingement. Am J Sports Med 2017; 45: 612–9.
11. Papalia R, Del Buono A, Franceschi F et al. Femoroacetabular impingement syndrome management: arthroscopy or open surgery? Int Orthop 2012; 36: 903–14.
12. Bolia IK, Fagotti L, McNamara S et al. A systematic review-meta-analysis of venous thromboembolic events following primary hip arthroscopy for FAI: clinical and epidemiologic considerations. J Hip Preserv Surg 2018; 5: 190–201.
13. Prodromos J, Rackley J, Mulcahey MK. A review of important medical and surgical considerations for obese patients undergoing arthroscopic surgery. Phys Sportsmed 2016; 44: 231–9.