

Gelişimsel Kalça Displazisi Tanılı Hastalarda Yürüme Çağında Artroskopik Redüksiyon Ve Dega Asetabuloplasti Tedavisi

Arthroscopic Reduction and Dega Acetabuloplasty Treatment in Walking Age Children with Irreducible Developmental Dysplasia of the Hip

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ÖZ

GİRİŞ ve AMAÇ: Çalışmamızın amacı merkezimizde yürüme çağında gelişimsel kalça displazisi tanısı almış hastalarda aynı seansta yapılan artroskopik redüksiyon ve Dega osteotomisi cerrahisinin radyolojik ve klinik sonuçlarını incelemektir.

YÖNTEM ve GEREÇLER: Aynı seansta artroskopik redüksiyon ve Dega osteotomisi yapılan 13 hasta retrospektif olarak incelendi. Preoperatif Tönnis evresi, asetabuler indexler, postoperatif femoral baş örtüm oranı ve asetabuler indexler ölçüldü. Kalamichi-MacEwen sınıflamasına göre AVN, MacKay sınıflamasına göre klinik durum değerlendirildi.

BULGULAR: Ameliyat öncesi, ortalama AI açısı 38.4 (dağılım 34-44) idi ve en son takipte ortalama AI 21.7 (dağılım, 20-26) derece idi. Ortalama, femur başı kapsama oranı %90.7 (aralık, %80-100) idi. McKay sınıflamasına göre; 7 hastada Grade I kalça, 5 hastada Grade II, 1 hastada Grade III kalça vardı.

TARTIŞMA ve SONUÇ: Gelişimsel kalça displazisi tedavisinde yürüme çağı döneminde artroskopik redüksiyon, kısa dönem sonuçları açısından açık redüksiyona alternatif olabilecek bir tekniktir. Daha büyük hasta sayıları ile prospektif, uzun vadeli ve karşılaştırmalı çalışmalara ihtiyaç olduğu aşikardır.

Anahtar Kelimeler: gelişimsel kalça displazisi, artroskopik redüksiyon, dega osteotomisi

ABSTRACT

INTRODUCTION: The aim of our study was to investigate the radiological and clinical results of arthroscopic reduction, which has promising results, along with Dega acetabuloplasty in children over 18 months of age who were admitted to our center.

METHODS: 13 patients operated with arthroscopic reduction and Dega acetabuloplasty in same session evaluated retrospectively. Preoperative Tönnis grade, acetabular indexes, postoperative acetabular indexes, coverage ratio of the femoral head were measured. Postoperative AVN was evaluated according to the Kalamchi and MacEwen classification and MacKay classification was criteria for clinical evaluation.

RESULTS: Preoperatively, the mean AI angle was 38.4 (range, 34 to 44) degree and at the latest follow-up, the mean AI was 21.7 (range, 20 to 26) degrees. The mean, femoral head coverage ratio was 90.7% (range, 80 to 100%). According to McKay classification; 7 patients had Grade I hip, 5 patients had Grade II, and 1 patient had Grade III hip.

DISCUSSION and CONCLUSION: Arthroscopic reduction for developmental dysplasia of hip at walking age is a technique that might be an alternative to open reduction from the point of short-term results. It is clear that prospective, long-term and comparative studies with larger patient numbers are needed.

Keywords: developmental dysplasia of hip, arthroscopic reduction, dega osteotomy

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INTRODUCTION

Developmental dysplasia of the hip (DDH) is a broad pathology including the whole cases of dysplasia, subluxation and dislocation. In many resources, the incidence of DDH is reported to be 1-1.5 in 1000 live births (1).

The pathology in the femur, acetabulum or surrounding soft tissues should be removed as immediate as possible, and the joint congruence should be provided. Otherwise, dysfunctions will arise in the structures forming the joint due to the growth effect and the success of the treatment will gradually decrease. The gold standard treatment in children over 18 months of age is open reduction. In addition, periacetabular osteotomies can be added in the presence of acetabular dysplasia. Again, femoral shortening and rotational osteotomies can be added, if needed. Although numerous techniques have been described as periacetabular osteotomy, the most commonly used osteotomy procedures are Dega, Salter and Pemberton osteotomies (1-3). Arthroscopic reduction in patients with DDH was first described by Gross in 1977, and there are a few case series reporting more results in the literature (4). The aim of our study was to investigate the radiological and clinical results of arthroscopic reduction, which has promising results, along with Dega acetabuloplasty in children over 18 months of age who were admitted to our center.

METHODS

Fifty-eight patients over 18 months of age admitted to our center between 2014-2016 were retrospectively evaluated. Patients who previously had failure of Pavlik's bandage or underwent failed closed reduction, those who underwent femoral osteotomy, and those with known arthrogryposis and meningomyelocele-like diseases and other orthopedic pathologies such as clubfoot, vertical talus, and syndactyly were excluded from the study. Four patients were not included in the study since they underwent femoral shortening and rotational osteotomy. Sixteen of these patients were found to have arthroscopic reduction and DEGA osteotomy in the same session. One patient could not be reached, and since follow-up durations of two patients were 6 months they were not included in

the study. None of these patients had previously received any other treatment. Of the patients included in the study, 12 were female and 1 was male. A total of 13 hips, 8 of which were right hip and 5 of which were left hip, were operated, and one patient was operated from both hips. The mean age was 21.6 months. (18-26 months) (**Table 1**). The preoperative and postoperative AP pelvis x-ray images of the patients were examined and preoperative Tönnis grade, acetabular indexes, postoperative acetabular indexes, coverage ratio of the femoral head were measured. Postoperative AVN was evaluated according to the Kalamchi and MacEwen classification (2,5,6). The patients were evaluated in terms of dislocation and their ages at the time of admission were found from the physical examination files of the last follow-up and range of motion (ROM) of the operated hips during the last follow-up were noted.

Surgical Technique

The surgical procedure was performed in supine position under general anesthesia. The hip joint was first entered by a 2.7 mm 70-degree arthroscope under fluoroscopy through the medial subadductor portal situated 1 cm lateral and anterior of the the ischial tubercle without traction while the hip was positioned at 30-60 degrees of abduction and 90 degrees of flexion. Following the initial arthroscopic imaging, an anterolateral portal was opened at 2 cm distal and 1 cm lateral of the superior iliac spine from which the procedure was carried out. After the examination of the joint, the ligamentum teres was cut from the femoral junction site with the help of a +4.0 mm shaver and cleared by advancing to the acetabular junction site respectively. It was cleared with the help of a pulvinal shaver and punch. Afterwards, the hypertrophied transverse acetabular ligament was cut with the help of arthroscopic scissors. After reduction of the femoral head, the reduction was checked, and if there was any capsular area preventing reduction, it was released by radiofrequency ablation (7). (Figure 1) In three patients, ilipsoas tenotomy was added to the procedure, considering that ilipsoas muscle significantly prevented reduction. These patients were excluded from the study.

Then, DEGA osteotomy was carried out according to the previously described pattern (8). After the stability was checked, pelvipedal casting was performed following suturing. The patients underwent postoperative control with pelvis AP x-ray and the reduction was confirmed. Pelvipedal cast was removed in the 6th week. The Dennis-Browne orthosis was used for 8 weeks.

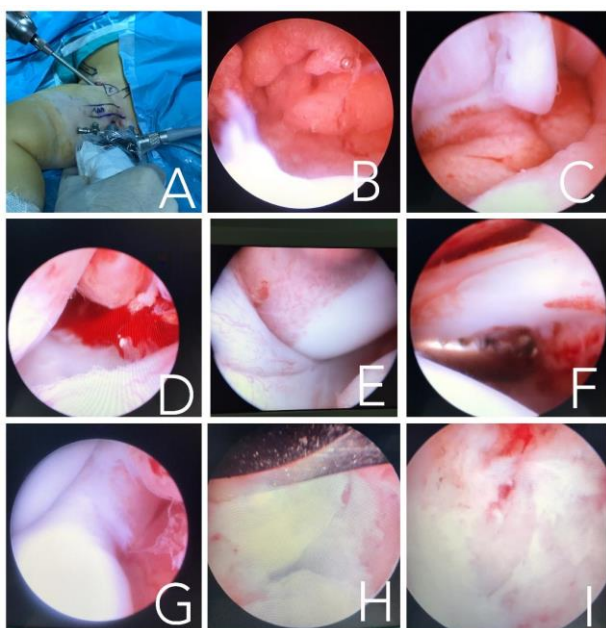


Figure 1. A: arthroscopic portals, B: pulvinar, C: capsule, D: labrum, pulvinar and ligamentum teres, E: ligamentum teres preventing reduction between acetabulum and femoral head, F: ligamentum teres excising by shaver, G: labrum, H: hypertrophied transvers acetabular ligament released by arthroscopic scissor, I: acetabulum after excising pulvinar and ligamentum teres

All patients were clinically followed up for at least 24 months postoperatively and the mean follow-up duration was 28 months (range, 24 to 38 months). The residual leg length discrepancy, range of motion (ROM) of the operated hip, preoperative and postoperative acetabular indexes (AI) and acetabular coverage ratio of the femoral head (CRFH) were also measured (9). The McKay classification was used for clinical evaluation.

RESULTS

All preoperative and postoperative data of patients were shown in Table 1. Preoperatively, the mean AI angle was 38.4 (range, 34 to 44) degree and at the latest follow-up, the mean AI was 21.7 (range, 20 to 26) degrees. The mean femoral head coverage ratio was 90.7 % (range, 80 to 100%). According to McKay classification; 7

patients had Grade I hip, 5 patients had Grade II, and 1 patient had Grade III hip

Residual leg length discrepancy or, limited range of motion of the operated hip joint was not detected in any, of our patients during the follow-up period. 2 patients in diagnosed as type 2 AVN according to Kalamchi-MacEwen AVN classification. Re-dislocation was not observed in any patients.

DISCUSSION

Nowadays, quite a few very challenging orthopedic cases can be treated successfully with arthroscopic surgery. The treatment of DDH with arthroscopic reduction is not a very common surgery since it requires both pediatric orthopedic and arthroscopic surgery experience. There are publications describing more techniques and reporting results with regard to arthroscopic surgery. In most of the studies, the results of patients over and under 18 months of age have been given together; the evaluation of the patients in the same category while evaluating the postoperative acetabular indexes draws attention as a limitation since acetabular osteotomy was not performed on each patient. In our study, arthroscopic reduction, a new technique, was performed along with periacetabular osteotomy in the treatment of patients over 18 months of age, and the results obtained have been presented.

Of the patients with DDH, 83% required a second operation after closed reduction and 20% required a second operation after open reduction due to persisting acetabular dysplasia. Therefore, the majority of surgeons routinely add acetabuloplasty to the surgery after 18 months (10). Whereas, we prefer DEGA acetabuloplasty for lateral acetabuloplasty.

In patients under 18 months of age Bulut et al. and in children under 2 years of age and not requiring supraacetabular osteotomy, Lee et al. arthroscopically eliminated the structures preventing intraarticular reduction using a technique that may be described as arthroscopic-assisted reduction after open iliopsoas tenotomy, and reported good results (11-13). Again, Xu et al.

Table 1. Preoperative and postoperative finding of patients

Patient	Age (month)	Sex	Side	Tönnis Grade	Preoperative AI	Follow-up	Postoperative AI	CRFH%	Shanton-Menard
1	22	F	R	Type 3	40	24	22	100	normal
2	18	F	R	Type 4	44	24	20	82	normal
3	19	F	L	Type 3	38	24	21	90	normal
3	24	F	R	Type 2	43	27	22	100	normal
4	21	F	L	Type 2	39	26	21	88	normal
5	22	F	R	Type 3	32	32	20	90	normal
6	19	M	R	Type 3	43	26	21	80	normal
8	25	F	L	Type 3	34	28	20	100	normal
9	26	F	L	Type 2	41	28	25	80	normal
10	24	F	L	Type 3	39	28	26	90	normal
11	24	F	R	Type 3	35	30	21	100	normal
12	19	F	R	Type 4	37	38	24	80	normal
13	18	F	R	Type 3	35	30	20	100	normal

published a 40-patient series of arthroscopic-assisted reduction and reported that better functional results could be obtained with arthroscopic treatment although the patients were not homogenous in terms of age and the majority of them later required supraacetabular osteotomy (14).

Kitano performed arthroscopic reduction on 10 patients after walking age in 2010, and reported that 3 patients required Salter supraacetabular osteotomy due to persisting acetabular dysplasia (15).

Unfortunately, there are not too many case series completely carried out arthroscopically. Eberhardt et al. reported that they achieved promising results with simultaneous arthroscopic hip reduction and Salter osteotomy performed on patients with a mean age of 21.4 years and a mean follow-up duration of 15.4 months. It was indicated that arthroscopic iliopsoas tenotomy was performed on these patients, in addition, it was expressed an opinion that the procedure should not be performed without having adequate experience because of the high risk of neurovascular injury (16).

Zhao et al. reported good results in a series of 8 patients with a mean age of 15 months, and suggested that there was no residual dysplasia even

in children over 18 months of age with a high acetabular index. We are of the opinion that we prevented most of the patients from undergoing a second surgery since we did not perform supraacetabular osteotomy on patients with severe dysplasia in the same session. Persisting acetabular dysplasia during follow-ups and a second operation need are exhausting and backbreaking for patient and child, and increases the rate of surgery-related complications (17).

The results of our study, which aimed to present the results of patients undergone arthroscopic reduction and DEGA acetabuloplasty in the same session, seem promising. Given the previous literature, although good results have been reported in cases where iliopsoas tenotomy was not performed after walking age, inability to perform iliopsoas tenotomy arthroscopically most of the time and inability to perform capsular plication and being contented with only capsular release are remarkable as limitations in terms of arthroscopic reduction for this period that may be considered to be late. On the other hand, the fact that it provides a large dissection and does not cause capsular damage can be shown as an advantage in terms of low rates of avascular necrosis. The number of patients and short follow-up duration and retrospective nature of the study are important limitations.

CONCLUSIONS

Considering these data, arthroscopic surgery for hip dislocation is a technique that might be an alternative to open reduction from the point of short-term results. It is clear that prospective, long-term and comparative studies with larger patient numbers are needed. Although it requires pediatric orthopedic surgery and arthroscopic surgery experience at the same time and has challenges in terms of the long learning curve, we anticipate that better results can be obtained as it becomes widespread and the experience increases as with every surgical procedure.

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