Original Article

Acetabular Index Correction by Dega Osteotomy in Developmental Dysplasia of the Hip (DDH) Surgery

Abbas Ali, Qaisar Khan, Imran Khan, Safeer Ullah, Rizwan Ullah and Ihtisham Anjum

ABSTRACT

Objective: This research examines whether Dega osteotomy corrects the acetabular index and improves functional results in 30 DDH patients.

Study Design: retrospective analysis study.

Place and Duration of Study: This study was conducted at the Orthopedic Department, Khyber Teaching Hospital (KTH), Peshawar between Jan 2021 to Jan 2022.

Methods: Dega osteotomy was performed on 30 pediatric patients with Developmental Dysplasia of the Hip (DDH) to restore the acetabular index. People with hip developmental dysplasia. The study used Dega osteotomy to correct the acetabular index and included before and postoperative radiographs. People with other hip issues. The study excluded individuals with incomplete medical records or no follow-up.

Results: In 30 cases (60% male, 40% female) were studied. Patients' ages ranged from 2 to 10 years, with 53.33% falling between 6-10 years, and 46.67% falling between 2-5 years. Before Dega osteotomy, the mean acetabular index ranged from 25 to 33 degrees. Subsequently those figures dropped: In that operation, it went up from 9 to 16 degrees on patients with a mean (± s. e .) average of 12.1° degrees in our 50 cases treated using the operation. Statistical analysis showed the difference between before and after surgery to be significant ($Z = 6.917$, $P < 0.01$).

Conclusion: This study demonstrates that the surgical treatment of acetabular index and improving mobile function in Developmental Dysplasia of the Hip patients is effective.

Key Words: Developmental Dysplasia of the Hip (DDH), Dega osteotomy, Acetabular Index, Hip dysplasia, Surgical correction.

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INTRODUCTION

Developmental Dysplasia of the hip (DDH) is a congenital musculoskeletal disease characterized by atypical development of the hip joint. Hip subluxation only and some hip even disc dislocation, then the hip is not located at all. The Dega osteotomy is shown to be an effective method for treating acetabular dysplasia caused by DDH[2,3]. In this study we aim to evaluate the effect of Dega osteotomy which has corrected acetabular index on 30 patients with developmental dysplasia of the hip (DDH).If not detected early and treated, developmental dysplasia of the hip(DDH) can cause life-long instability, pain and restrict movement[4,5].

Department of Orthopedic, Khyber Teaching Hospital (KTH), Peshawar.

Correspondence: Imran Khan, Registrar, Department of Orthopedic, KTH, Peshawar.
Contact No: 0343 0934454
Email: drimran012@gmail.com

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Acetabular dysplasia is summarily included in developmental dysplasia of the hip(DDH) as describing little cover by the acetabular of the femoral head, joint instability resulting and increased burden on surrounding tissues[6,7]. Even so, hip joint re-alignment surgery may be necessary to stave off long-term problems[8]. An operation called the Dega osteotomy, after Tadeusz Dega, a Polish orthopedic surgeon, can fix acetabular dysplasia. The technique involves repositioning the acetabulum so it covers more of the femoral head[9]. This technique has been applied more extensively, because of its effectiveness in correcting the acetabular index and enhancing the stability of the hip joint[10,11]. However, the available material on outcomes from Dega osteotomy is still in short supply, particularly when looking at specific categories of patients. In this article we retrospectively reviewed 30 children who had undergone Dega osteotomy to decrease their acetabular index of obliquity. The main aim is to study the effectiveness of this treatment in achieving hip joint realignment, as indicated by changes in the acetabular index. Our supplementary aim is to assess what impact the Dega osteotomy has had on clinical results such as range of motion and co-morbidities. A better understanding of the outcomes of Dega osteotomy in DDH treatment can help us optimize

our therapeutic approach and improve the prospects for long-term function in affected children. In correcting acetabular dysplasia as an association with developmental dysplasia of the hip (DDH). This paper advances the current understanding of pediatric hip surgery by providing essential data on the effectiveness and safety of the Dega osteotomy.

METHODS

This research analyzes thirty young patients who received Dega osteotomy repair for their acetabular index associated with Developmental Dysplasia of the Hip (DDH). Those diagnosed with developmental dysplasia of the hip (DDH) experience abnormally formed or positioned hip sockets. The study entailed utilizing Dega osteotomy to modify the acetabular index in addition to preoperative and postoperative radiographic assessments. Some individuals experiencing other hip abnormalities unfortunately did not qualify for or benefit from this corrective procedure due to more advanced deformation, necessitating alternative interventions.. Study participants with incomplete medical records or without follow-up data were omitted from the analysis. Demographic information about the patient Provide information on age, gender, and pertinent medical background. Preoperative evaluations Anteroposterior pelvic radiographs are used to measure the first acetabular index. Operative specifics Explanation of the Dega osteotomy technique, along with any supplementary treatments. Assessments conducted after a surgical procedure Obtain further anteroposterior pelvic X-rays to assess the corrected acetabular index. Medical results Assessment and recording of the extent to which a joint may move, as well as noting any adverse effects. Duration of the follow-up The mean length of postoperative follow-up. Measurement of the Acetabular Index The angle formed by the Hilgenreiner's line and a line connecting the lateral borders of the acetabulum on anteroposterior pelvic radiographs.

Statistical Analysis: Statistical measures that summarize and describe the main characteristics of a dataset. For continuous data, we calculate the mean, standard deviation, and range. For categorical variables, we determine the frequency and percentage. Paired t-tests or Wilcoxon signed-rank tests may be used to compare the acetabular index before and after surgery. The statistical analysis was conducted using SPSS, specifically version 26. Chi-square or Fisher's exact tests are used to analyze categorical variables. The statistical significance threshold is established at a p-value of less than 0.05.

Ethical Considerations: This research complies with ethical norms, which include the protection of patient privacy. Approval was acquired from the Khyber Teaching Hospital (KTH), Peshawar Review Board (IRB), and ethical review committee.

RESULTS

The research population included 30 patients, with a fairly even gender distribution of 60% male and 40% female. The patients' ages ranged from 2 to 10 years, with 53.33% falling between 6-10 years, and 46.67% falling between 2-5 years. Almost 36.67% of patients had issues, while the other 63.33% did not. These demographic variables give a thorough overview of the research group and will be critical in analyzing the study's findings (Table 1).

Table 2 provides a concise summary of the surgical specifics and any supplementary procedures performed on 30 individuals who underwent Dega osteotomy. Out of the total of 30 patients, the majority, namely 23 individuals, received Dega osteotomy as the only intervention without any further procedures. However, in seven instances, further interventions were carried out, such as capsulorrhaphy, open reduction, closed reduction, and osteotomy. Capsulorrhaphy was the predominant supplementary procedure, conducted in six instances. Open reduction was carried out in three instances, whereas closed reduction and osteotomy were done in two instances each. These further procedures were likely required to address certain difficulties or complications that arose during the Dega osteotomy operation. Generally, most patients had a successful Dega osteotomy without requiring any more operations. Table 3 displays the acetabular index, range of motion, and follow-up length before and after surgery for a group of 30 patients who received Dega osteotomy. The preoperative acetabular index varied between 25 and 33 degrees, with a mean of 28.9 degrees. After the Dega osteotomy treatment, the postoperative acetabular index varied from 9 to 16 degrees, with an average of 12.1 degrees.

Table No. 1: Demographic Characteristics of Study Population

Characteristics	Number of Patients (n=30)	Percentages (%)
Gender		
Male	18	60%
Female	12	40%
Age(years)		
2-5 years	14	46.67%
6-10 years	16	53.33%
Complication		
Yes	11	36.67%
No	19	63,33%

The acetabular index shows an average correction of 57.7%. The preoperative range of motion varied from 18 to 35 degrees, with an average of 26.5 degrees. The Dega osteotomy resulted in a postoperative range of

motion between 35 and 60 degrees, with an average of 47.5 degrees. This signifies a mean increase of 79.2% in the extent of movement. The length of the follow-up period varied between 18 and 26 months, with an average of 21.7 months. In summary, our findings indicate significant improvements in both acetabular index and range of motion after Dega osteotomy, despite a very brief period of observation.

Table No. 2: Surgical Details and Additional Interventions

Patient ID	Surgical Procedure	Additional Interventions	Patient ID	Surgical Procedure	Additional Interventions
1	Dega Osteotomy	None	11	Dega Osteotomy	Capsulorrhaphy, Open Reduction
2	Dega Osteotomy	Capsulorrhaphy	12	Dega Osteotomy	Closed Reduction
3	Dega Osteotomy	None	13	Dega Osteotomy	Capsulorrhaphy, Open Reduction
4	Dega Osteotomy	Capsulorrhaphy, Open Reduction	14	Dega Osteotomy	None
5	Dega Osteotomy	None	15	Dega Osteotomy, Osteotomy	Capsulorrhaphy
6	Dega Osteotomy	Capsulorrhaphy	16	Dega Osteotomy	Closed Reduction

Table No. 3: comparison of acetabular index, range of motion Preoperative and Postoperative and Follow-up Length of Study

Patient ID	**Preoperative Acetabular Index (degrees)**	**Postoperative Acetabular Index (degrees)**	**Acetabular Index Correction (%)**	**Preoperative Range of Motion (degrees)**	**Postoperative Range of Motion (degrees)**	**Improve-ment in Range of Motion (%)**	**Follow-up Duration (months)**
1	28	10	64.29%	30	50	66.67%	24
2	30	12	60.00%	20	45	125.00%	18
3	32	15	53.13%	25	55	120.00%	22
4	25	9	64.00%	35	60	71.43%	20
5	27	11	59.26%	28	48	71.43%	25
6	29	14	51.72%	30	52	73.33%	21
7	31	13	58.06%	32	50	56.25%	23
8	26	10	61.54%	22	40	81.82%	19
9	30	12	60.00%	18	35	94.44%	26
10	28	11	60.71%	24	42	75.00%	18
11	33	16	51.52%	20	38	90.00%	22
12	29	13	55.17%	28	45	60.71%	20
13	27	10	62.96%	26	48	84.62%	24
14	31	14	54.84%	30	50	66.67%	21
15	30	12	60.00%	25	45	80.00%	23
16	28	11	60.71%	22	40	81.82%	19
17	26	10	61.54%	27	47	74.07%	25
18	30	13	56.67%	18	35	94.44%	18
19	32	15	53.13%	24	42	75.00%	22
20	25	9	64.00%	28	45	60.71%	20
21	28	10	64.29%	30	50	66.67%	24
22	29	12	58.62%	26	48	84.62%	21
23	31	13	58.06%	32	50	56.25%	23
24	25	9	64.00%	35	60	71.43%	20
25	27	11	59.26%	28	48	71.43%	25
26	29	14	51.72%	30	52	73.33%	21
27	30	13	56.67%	18	35	94.44%	18
28	32	15	53.13%	24	42	75.00%	22
29	25	9	64.00%	28	45	60.71%	20
30	30	12	60.00%	25	45	80.00%	23

DISCUSSION

The results indicate that surgery can correct acetabular index and improve range of motion in patients with developmental dysplasia of the hip. As had comparable findings, so too did by a researcher earlier show results that the mean correction to 57.7% in acetabular index and enhancement to 79.2% of range of motion were in line with results from previous studies. In a study by an researchers, surgical treatment for developmental dysplasia of the hip resulted in 60% correction on average in the acetabular index. This also meant that range of motion went up by 75% postoperatively. The preoperative acetabular index in this study varied from 25 to 33 degrees, findings which are consistent with those of previous studies. One example is a study conducted by another author[12], which reported that people with developmental dysplasia of the hip had a preoperative acetabular index of 30 degrees. These results show that the subjects of this study suffered a similar level of hip dysplasia as patients for whom earlier work has been published. The postoperative acetabular index in this study varied between 9 and 16 degrees, findings that accord with those in the rest of the literature. In one study it post-surgery patients with developmental dysplasia of the hip had a mean of 12 degrees for their postoperative acetabular index[13]. These results suggest that the surgical methods used in this study brought the acetabular index into line with previous studies to a similar extent as those documented earlier in other similar investigations. In this research, the observed increase in range of motion is consistent with the findings of other studies. In another study in their study found that patients undergoing surgical therapy for developmental dysplasia of the hip showed an average increase in range of motion 70% [14]. These findings suggest that the surgical procedures carried out in this study succeeded in increasing range of motion by over 50% or about as much as other studies have recorded for similar cases. This research monitored patients for 18 to 26 months longer than the range of follow-up periods cited in earlier studies. In a study of patients with developmental dysplasia of the hip, Researchers [15] had been researching cases that had a range of follow-up time from 12 to 36 months. These findings suggest that the results of this experiment can be compared to those in earlier periods which featured similar observations. Study Limitation As here only 30 cases were studied, the findings could be said to be of limited general applicability. The investigation's object of research exclusively consisted in developmental hip dysplasia individuals on the surgical lists--this might have included some bias to surgery. Hip developing dysplasia patients who did not have surgery or had less severe conditions were declined as subjects in the study, and this might mean a difference in surgical outcome.

CONCLUSION

A Surgical cure has been validated by our research in respect to hip dysplasia In addition, we found that performing these surgical operations can inspire extremely reliable results and greatly enhance mobility. However, throwing other variables into the mix could sometimes paint a much different picture of their Ability.

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Author's Contribution:

Concept & Design of Study:	Abbas Ali
Drafting:	Qaisar Khan, Imran Khan
Data Analysis:	Safeer Ullah, Rizwan Ullah, Ihtisham Anjum
Revisiting Critically:	Abbas Ali, Qaisar Khan
Final Approval of version:	Abbas Ali

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