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Dr. Rajneesh Jindal
Professor, Department of Orthopedics, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India

Dr. GL Arora
Professor & HOD, Department of Orthopedics, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India

Correspondence
Dr. Rajneesh Jindal
Professor, Department of Orthopedics, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India

To assess the early diagnostic criteria and wrist arthroscopy treatment of ulnar impaction syndrome- A clinical study

Dr. Rajneesh Jindal and Dr. GL Arora

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Abstract
Background: The ulnar impaction syndrome is degenerative condition characterized by ulnar wrist pain, swelling, and limitation motion related to excessive load bearing across the ulnar aspect of the wrist. The present study was conducted to assess the early diagnostic criteria and wrist arthroscopy treatment of UIS.
Materials & Methods: This study was conducted in the department of orthopaedics in year 2014. It included 10 cases of UIS. All the patients were evaluated clinically for pain, functional status, range of motion and grip strength after a follow up. Final clinical assessment of patients was performed by wrist function scoring system of Green and O'Brien modified by Cooney *et al.*
Results: Out of 10 examined patients, 7 were males and 3 were females. The difference was statistical significant (P-0.05). Clinical scoring system by Green and O'Brien modified by Cooney shows pain as none, mild moderate and severe with score of 25, 20, 15 and 0 respectively. Functional status as Returned to regular employment, Restricted employment, Able to work but unemployed, Unable to work because of pain with score 25, 20,15 and 0 respectively. Range of motion as full, 75-99%, 50-74%, 25-49%, < 25% of normal with score 25, 15 and 10 and 0 respectively. Grip strength as normal, 75-99%, 50-74%, 25-49%, 0- 24% with score 25, 15, 10, 5 and 0 respectively. Number of patients with right side injury was 6 and left side injury was 4. Ulnar variance <4mm was 8 and >4mm was 2. TFCC type II C injury was seen in 6 patients and TFCC type II D injury was seen in 4 patients. Palmar flexion was 46.02 mm before operation which increased to 51.11 after operation. Dorsal extension was 42.34 mm which increased to 45.55mm. Radial deviation was 18.43 mm which increased to 19.34 mm. ulnar deviation was 22.28 which increased to 25.34mm. Anterior rotation was 68.56 mm which increased to 77.45mm. Posterior rotation was 68.32 mm which increased to 76.59mm. In all cases wound healed without complications.
Conclusion: Wrist arthroscopy can be useful in improving the diagnosis rate, optimizing the treatment plan and shorten the treatment cycle. However large scale studies are required to substantiate the results obtained in this study.

Keywords: Palmer flexion, range of motion ulnar impaction syndrome

1. Introduction
The ulnar impaction syndrome (UIS) can be defined as a degenerative condition characterized by ulnar wrist pain, swelling, and limitation motion related to excessive load bearing across the ulnar aspect of the wrist. Chronic impaction of the ulnar head against the triangular fibrocartilage complex and ulnar carpus results in progressive deterioration of the triangular fibrocartilage complex, chondromalacia of the lunate and ulnar head, and attrition of the lunotriquetral ligament [1].
Milch (1941) [2], first described Ulnar impaction syndrome (UIS). It is found by research and clinical experience that the wrist trauma is not the only risk factor of UIS. Other factors such as chronic wrist fatigue and occupation disease can also cause UIS. Bell and associates defined ulnar impingement syndrome as "a short ulna impinging on the distal radius and causing a painful, disabling pseudarthrosis."
The pathogenesis is mainly the wrist ulnar overload, which causes chronic impact of ulnar head, triangular fibrocartilage complex (TFCC) and lunate and triangular bone. This leads to nutrition disorder of the blood supply and synovial fluid of ulnar wrist structure,

resulting in ulnar wrist joint degeneration [3]. Ultimately, a group of syndrome such as ulnar wrist pain and functional limitation occur. With the development of handicraft industry and increase of various works that need a large amount of repeated wrist ulnar deviation strength, the incidence of UIS is increasing, but the traditional simple ulnar shortening osteotomy has more complications. A painful condition resulting from articular incongruity of the distal radioulnar joint can present with findings similar to the ulnar impaction syndrome [4]. In a substantial number of cases, in fact, ulnar impaction syndrome may coexist with distal radioulnar joint abnormalities. The successful surgical treatment of disorders of the ulnar aspect of the wrist depends on accurate assessment of the factors contributing to the disorder [5]. The present study was conducted to assess the early diagnostic criteria and wrist arthroscopy treatment of UIS.

2. Materials & Methods

This study was conducted in the department of orthopaedics in year 2014. It included 10 cases of UIS. Patients were informed regarding the study and written consent were taken. Patient's information such as name, age, gender was recorded.

The diagnosis of UIS was based on following points (1) Wrist trauma history and long term repeated hand work history; (2) the history of wrist ulnar-side rotation, compression and ulnar wrist pain, with or without clicking; (3) X ray: Most of the ulnar positive variation (ulna is over 2 mm greater than radius) is associated with osteosclerosis or/and cystic degeneration under proximal articular surface of ulna head, lunate bone and triangular bone, which may also be associated with Kienböck's disease, while minority of ulnar neutral variation only need fist wrist pronation X-ray (dynamic ulnar positive variance); (4) magnetic resonance imaging (MRI) performance: The signal changes of the lunate bone, triangular bone, as well as TFCC; (5) wrist arthroscopic changes: Chondromalacia of lunate bone, triangular bone and various types of TFCC injury.

On examining the patients, if the ulnar positive variance was less than 4 mm, the arthroscopic wafer resection was performed. If the ulnar positive variance was more than 4 mm, the arthroscopic resection of injury and degenerative triangular fibrocartilage complex and ulnar osteotomy were conducted.

Postoperatively, 2 grm Cefmetazole sodium was intravenously injected O.D X 7 days for preventing infection. The patients with the ulna osteotomy were treated with using plaster for 2 months and the patients with only the arthroscopic treatment were treated with plaster external fixation for 1-week. Then the plaster was removed, and the positive functions exercise was performed.

All the patients were evaluated clinically for pain, functional status, range of motion and grip strength after a follow up. Final clinical assessment of patients was performed by wrist function scoring system of Green and O'Brien modified by Cooney *et al* [6]. Results were tabulated and subjected for correct inferences. P value < 0.05 was considered significant.

3. Results

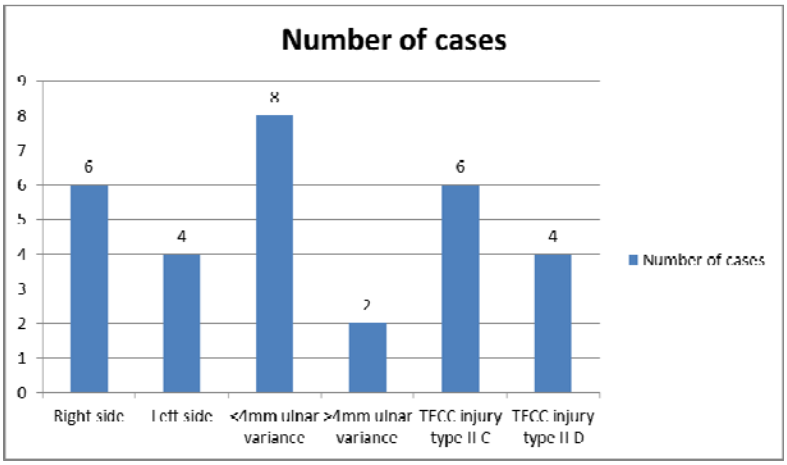
Out of 10 examined patients, 7 were males and 3 were females. The difference was statistical significant (P-0.05) (Table I). Table II shows clinical scoring system Green and O'Brien modified by Cooney. It shows pain as none, mild moderate and severe with score of 25, 20, 15 and 0 respectively. Functional status as Returned to regular employment, Restricted employment, Able to work but unemployed, Unable to work because of pain with score 25, 20,15 and 0 respectively. Range of motion as full, 75-99%, 50-74%, 25-49%, < 25% of normal with score 25, 15 and 10 and 0 respectively. Grip strength as normal, 75-99%, 50-74%, 25-49%, 0- 24% with score 25, 15, 10, 5 and 0 respectively. Graph I shows that number of patients with right side injury were 6 and left side injury were 4. Ulnar variance <4mm was 8 and >4mm was 2. TFCC type II C injury was seen in 6 patients and TFCC type II D injury was seen in 4 patients. Graph II shows that palmar flexion was 46.02 mm before operation which increased to 51.11 after operation. Dorsal extension was 42.34 mm which increased to 45.55mm. Radial deviation was 18.43 mm which increased to 19.34 mm. ulnar deviation was 22.28 which increased to 25.34mm. Anterior rotation was 68.56 mm which increased to 77.45mm. Posterior rotation was 68.32 mm which increased to 76.59mm. In all cases wound healed without complications.

Table 1: Distribution of patients

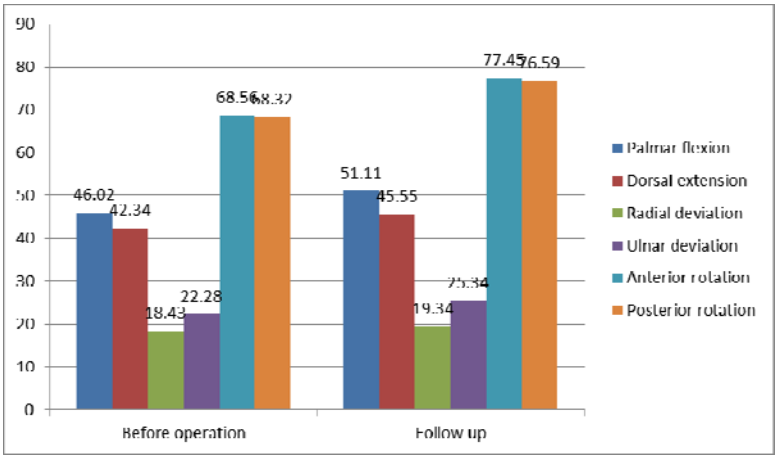
Total examined - 10			
Gender	**Male**	**Female**	**P value**
Number	7	3	0.05

Table 2: Clinical scoring system of Green and O'Brien modified by Cooney

Parameters	Findings	Score
Pain	None	25
	Mild, occasional	20
	Moderate, tolerable	15
	Severe, intolerable	0
Functional status	Returned to regular employment	25
	Restricted employment	20
	Able to work but unemployed	15
	Unable to work because of pain	0
Range of motion	Full	25
	75-99%	15
	50-74%	10
	25-49%	5
	< 25% of normal	0
Grip strength	Normal	25
	75-99%	15
	50-74%	10
	25-49%	5
	0-24%	0



Graph 1: Demographic and surgical method



Graph 2: Comparison of wrist activity before operation and last follow up

4. Discussion

The ulnar impaction syndrome can be defined as the impaction of the ulnar head against the triangular fibrocartilage complex and ulnar carpus resulting in progressive degeneration of those structures. Ulnar impingement syndrome and arthrosis or incongruity of the distal radioulnar is differential diagnosis. The matched ulnar resection and the hemiresection interposition arthroplasty are both effective procedures; however, the Suave-Kapandji procedure also can be used to address relative ligamentous laxity at the ulnar aspect of the wrist. Careful preoperative evaluation and planning are therefore the key to successful treatment of the ulnar impaction syndrome [7].

The present study was conducted to assess the early diagnostic criteria and wrist arthroscopy treatment of UIS. Out of 10 examined patients, 7 were males and 3 were females.

We evaluated clinical scoring system Green and O'Brien modified by Cooney. It shows pain as none, mild moderate and severe, functional status as returned to regular employment, restricted employment, able to work but unemployed, unable to work because of pain, range of motion as full, 75-99%, 50-74%, 25-49%, < 25% of normal, grip strength as normal, 75-99%, 50-74%, 25-49%, 0- 24%. This is in accordance to Epner RA *et al* [8].

We found that right side injury were seen in 6 patients and left side injury in 4 patients. Ulnar variance <4mm was seen 8 patients and >4mm was seen in 2 patients. TFCC type II C injury was seen in 6 patients and TFCC type II D injury was seen in 4 patients. Feldon P *et al* [9]. also recorded similar points in their study. We found that palmar flexion, dorsal extension, Radial deviation, ulnar deviation, anterior rotation and posterior rotation increased after operation and at last follow up. This shows that the knee arthroscopy is the better option in patients with UIS. Palmer AK [10] found same results in his study. In all cases wound healed without complications.

Radiographic studies have been performed, that demonstrate significant alteration in ulnar variance with forearm rotation and with presence or absence of active, powerful grip. Maximum forearm pronation results in an increase in positive ulnar variance, whereas maximum forearm supination decreases ulnar variance. Ulnar variance increases significantly with powerful grip and returns to its original state with cessation of grip [11]. The magnitude of change in ulnar variance with forearm rotation and grip varies significantly yet is generally in the range of 1 to 2 mm.

5. Conclusion

Wrist arthroscopy can be useful in improving the diagnosis rate, optimizing the treatment plan and shorten the treatment cycle. However large scale studies are required to substantiate the results obtained in this study.

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