

---

# **Arthroscopic-Assisted Limited Carpal Fusion**

**Thesis**

Submitted for partial fulfillment of M.D. degree in  
Orthopedic Surgery

*By*

**Abdelrahman Ahmed Diaa Eldin Eldiasty**

M.B., B.Ch., M.Sc. of Orthopedic Surgery  
Ain Shams University

*Supervised by*

**Prof. Dr. Osama Youssef Rabie**

Professor of Orthopedic Surgery  
Ain Shams University

**Prof. Dr. Amr Abdelkader Hammad**

Professor of Orthopedic Surgery  
Ain Shams University

**Dr. Ahmed Naeem Atiyya**

Assistant Professor of Orthopedic Surgery  
Ain Shams University

Faculty of Medicine  
Ain Shams University  
2018

---

---

# ACKNOWLEDGEMENT

First of all, thanks to **ALLAH** the most Gracious and the most Merciful, who gave me strength, guided me along my whole life and never let me down.

It is an honor for me to carry out this work under the supervision of **Prof. Dr. Osama Youssef Rabie**, Professor of Orthopaedics, Ain Shams University. A true teacher, without his enthusiastic support and encouragement, this work would have never been completed.

My deepest thanks, gratitude and appreciation are due to Prof. Dr. **Amr Abdelkader Hammad**, Professor of Orthopaedics, Ain Shams University, for his kind guidance, caring advice and for always being there whenever needed.

I hope words may succeed to express my feelings of gratefulness towards **Dr. Ahmed Naeem Atiyya** Assistant Professor of Orthopaedics, Ain Shams University. He was not only an ideal mentor but a sincere friend and true big brother. I learned a lot from him how to make a decision before cutting with a scalpel. He trusted me enough to carry out demanding procedures under his guidance.

I am grateful for **Prof. Dr. Mohamed Mostafa El-Mahy** Professor of Orthopaedics & Head of hand & foot surgery unit, Ain Shams University and **Prof. Dr. Abd El-Hakim Abd-Allah**, Professor & head of the Orthopaedics department, Azhar University, for their acceptance to evaluate my work.

I am also very grateful to my professors and colleagues specially **Mostafa Ali, Ahmed Rayan, Amr Nabil**, and **Ramy Soliman**, you are true brothers whom I thank **GOD** for being there.

At last but not the least, I am speechless and will never find words to express my thanks to my family. You are my source of inspiration and motive to thrive. Without you I wouldn't be here today.

I am grateful for **my parents'** prayers in sleepless nights. **GOD** made you the reason I exist & your endless love is the reason I survive. I promise I will do my best & never quit. My uncle & God Father **Prof. Dr. Ahmed Saad**, professor & head of psychiatry department, Ain shams University, you are my role model. My sister **Abeer** thanks for being my strength when I was weak. My wife **Aalaa** thanks for being there through my hard times.

I hope you are proud of me. I'll always be indebted to you all.

I'm everything I'm because of you.

**Abdelrahman A. Diao Eldin Eldiasty**

---

# List of Contents

	Page
<b>List of tables</b>	<b>i</b>
<b>List of figures</b>	<b>ii</b>
<b>List of abbreviations</b>	<b>vii</b>
<b>Abstract</b>	<b>viii</b>
<b>Introduction and Aim of work</b>	<b>1</b>
<b>Review of literature</b>	
Arthroscopic Anatomy of the Wrist	<b>4</b>
Biomechanics of the Wrist	<b>13</b>
Principles of Limited Carpal Fusion	<b>28</b>
Types of Limited Carpal Fusion	<b>41</b>
<b>Patients and methods</b>	<b>57</b>
<b>Results</b>	<b>71</b>
<b>Case Presentation</b>	<b>86</b>
<b>Discussion</b>	<b>105</b>
<b>Conclusion</b>	<b>122</b>
<b>Summary</b>	<b>123</b>
<b>References</b>	<b>125</b>
<b>Arabic summary</b>	

---

# List of Tables

	Page
<b>Review of Literature: Types of Limited Carpal Fusion</b>	
<b>Table (1)</b> : Comparison of PRC and 4CF.	43
<b>Table (2)</b> : Wrist motion after midcarpal stabilization, then excision of the scaphoid and then excision of the triquetrum.	45
<b>Patients and Methods</b>	
<b>Table (1)</b> : Modified Wrightington Hospital wrist score.	61
<b>Table (2)</b> : Mayo Modified wrist score.	62
<b>Table (3)</b> : Working and viewing portals according to the procedure.	65
<b>Results</b>	
<b>Table (1)</b> : Demographics for 4 corner series.	72
<b>Table (2)</b> : Functional outcome for 4 corner series.	73
<b>Table (3)</b> : Patients demographics, dominance, operation, time to union, and complications for SC series.	78
<b>Table (4)</b> : Functional outcome for SC series.	79
<b>Discussion</b>	
<b>Table (1)</b> : Comparison between functional outcome after 4C fusion and PRC and the results of current study.	107
<b>Table (2)</b> : Comparison between functional outcome after PRC and 4C fusion of Bisneto et al. and the results of current study.	108
<b>Table (3)</b> : Comparison between functional outcome after 4C fusion using K-wires or circular plate done by Rodgers et al. and the results of current study.	108
<b>Table (4)</b> : Comparison between Del Pinal et al. and current study results.	110
<b>Table (5)</b> : Comparison of the results of different series of open SC fusions to current series. (SLI = scapho-lunate instability, NDA= no data available).	112
<b>Table (6)</b> : Summary of results of arthroscopic SC fusion studies.	115

# List of Figures

## Page

### Review of Literature: Arthroscopic Anatomy of the Wrist

Fig. (1)	:	Overview of the dorsal (a) and volar (b) portals used in wrist arthroscopy.	5
Fig. (2)	:	"Box concept" of the wrist.	5
Fig. (3)	:	Arthroscopic radial-sided view through the 3/4 portal.	7
Fig. (4)	:	The left radio scapholunate ligament (Ligament of Testut).	7
Fig. (5)	:	Trampoline test. TFCC, triangular fibrocartilage complex.	9
Fig. (6)	:	Arthroscopic exploration of the ulnar compartment of the right wrist from the 4-5 radiocarpal portal.	10
Fig. (7)	:	Complete arthroscopic view of the radiocarpal joint.	10
Fig. (8)	:	Arthroscopic exploration of the midcarpal joint through the MCR portal.	11
Fig. (9)	:	Exploration of the corner of the four midcarpal bones (lunate, triquetrum, capitate and hamate) via the MCR portal.	12

### Review of Literature: Biomechanics of The Wrist

Fig. (1)	:	Taleisnik's columnar concept.	14
Fig. (2)	:	Lichtman's oval ring.	16
Fig. (3)	:	The wrist is a universal (cardan) type of articulation.	20
Fig. (4)	:	Human wrist dissected to show the distal articular surfaces of the proximal row and the transverse intercarpal ligaments.	21
Fig. (5)	:	Percentage of the applied load transmitted through the radioscapoid fossae (RS), the radiolunate (RL) fossa, the ulnolunate joint (UL) and through the ulnotriquetral joint (UT) on the normal wrist and for the arthrodesis treatments to SLAC/SNAC stage II and III.	26
Fig. (6)	:	Percentage of the applied load transmitted through: (a) the radioscapoid fossae (RS) and through the radiolunate (RL) fossae and (b) the ulnolunate joint (UL) and through the ulnotriquetral joint (UT) on the normal wrist and for scapholunate (SL), scaphocapitate (SC), lunotriquetral (LTri) and triscaphe (STT) arthrodesis treatments.	27

### Review of Literature: Principles of Limited Carpal Fusion

Fig. (1)	:	The concept of containment.	34
----------	---	-----------------------------	----

	<b>Page</b>
<b>Fig. (2)</b> : Drawing of an open and closing fusion.	<b>35</b>
<b>Fig. (3)</b> : Graph demonstrating the effect of wrist position on gripstrength.	<b>36</b>
<b>Fig. (4)</b> : Four corner fusion fixed by K-wires.	<b>37</b>
<b>Fig. (5)</b> : Fluoroscopic image of a 3C fusion performed with memory staples.	<b>38</b>
<b>Fig. (6)</b> : Postoperative fusion at the lunocapitate and triquetrum–hamate joint lines fixed by memory staples.	<b>38</b>
<b>Fig. (7)</b> : PXR posteroanterior and lateral views of a SC fusion using headless compression screws for the treatment of Kienböck's disease.	<b>39</b>
<b>Fig. (8)</b> : PXR (a) posteroanterior and (b) lateral views after successful 4C fusion with locking, dorsal circular polyether-ether-ketone (PEEK-Optima) plate (C) Intraoperative Xpode cup fixation.	<b>40</b>
<b>Review of Literature: Types of Limited Carpal Fusion</b>	
<b>Fig. (1)</b> : Anteroposterior PXRs showing the progressive stages of scapholunate advanced collapse wrist: Stage 1 (a), Stage 2 (b), Stage 3 (c).	<b>41</b>
<b>Fig. (2)</b> : Anteroposterior PXRs showing the progressive stages of scaphoid nonunion advanced collapse wrist: Stage 1 (a), Stage 2 (b), Stage 3 (c).	<b>42</b>
<b>Fig. (3)</b> : Percutaneous fixation of TqH with fluoroscopic control, b) postoperative PXR showing full union.	<b>44</b>
<b>Fig. (4)</b> : Fluoroscopic image of a 3C fusion performed with memory staples. b) union of 3C fusion fixed by screws.	<b>46</b>
<b>Fig. (5)</b> : SC fusion fixed by staples.	<b>47</b>
<b>Fig. (6)</b> : SC fusion fixed by screws.	<b>47</b>
<b>Fig. (7)</b> : PXR showing STT arthrosis.	<b>48</b>
<b>Fig. (8)</b> : Sagittal CT scan showing STT osteoarthritis with scaphoid extension.	<b>48</b>
<b>Fig. (9)</b> : Fully united STT fusion fixed by screw.	<b>49</b>
<b>Fig. (10)</b> : Posteroanterior view of the hand demonstrates a patient who had undergone attempted STT fusion 1 year earlier and now had a painful nonunion.	<b>50</b>
<b>Fig. (11)</b> : Trial of LT fusion by percutaneous insertion of triquetrolunate headless compression screw.	<b>52</b>
<b>Fig. (12)</b> : PXRs showing post traumatic distal radius fracture arthrosis at Radiolunate joint. (b) Fluoroscopic control of percutaneous fixation of RL fusion with cannulated screws.	<b>54</b>

	<b>Page</b>
<b>Fig. (13)</b> : PXR (P/A) view of the wrist demonstrating ulnar translocation of the lunate and carpus.	<b>54</b>
<b>Fig. (14)</b> : PXR showing diffuse post traumatic radioscaphoid arthritis (b) arthroscopic RSL fusion fixed by K-wires (c) RSL union achieved.	<b>56</b>
<b>Fig. (15)</b> : AP radiograph of a successful union of a RSL fusion performed in conjunction with excision of the distal pole of the scaphoid. A Darrach procedure has also been performed.	<b>56</b>

### **Patients and Methods**

<b>Fig. (1)</b> : Chart showing different diagnoses in our series.	<b>58</b>
<b>Fig. (2)</b> : Chart showing procedures done.	<b>58</b>
<b>Fig. (3)</b> : Pie chart showing distribution of occupation of cases in the 4C series.	<b>59</b>
<b>Fig. (4)</b> : Pie chart showing distribution of occupation of cases in the SC series.	<b>60</b>
<b>Fig. (5)</b> : Operative setting for the procedure.	<b>64</b>
<b>Fig. (6)</b> : Portals.	<b>66</b>
<b>Fig. (7)</b> : Curette used to remove cartilage from adjacent joint surfaces.	<b>66</b>
<b>Fig. (8)</b> : Arthroscopic views of adjacent bony surfaces after complete removal of cartilage, Scaphocapitate interface.	<b>67</b>
<b>Fig. (9)</b> : Insertion of wires for fixation of fusion mass.	<b>67</b>
<b>Fig. (10)</b> : Complete filling of the interface with graft after repeated impaction through the cannula.	<b>68</b>
<b>Fig. (11)</b> : Arthroscopic control of screw advancement.	<b>69</b>

### **Results**

<b>Fig. (1)</b> : Preoperative and Postoperative Grip strength in the 4C fusion series.	<b>74</b>
<b>Fig. (2)</b> : Preoperative and Postoperative ROM in the 4C fusion series.	<b>75</b>
<b>Fig. (3)</b> : Preoperative and Postoperative pain evaluation by VAS in the 4C fusion series.	<b>76</b>
<b>Fig. (4)</b> : Preoperative and Postoperative MMWS in the 4C fusion series.	<b>76</b>
<b>Fig. (5)</b> : Preoperative and Postoperative MWHWS in the 4C fusion series.	<b>77</b>
<b>Fig. (6)</b> : Preoperative and Postoperative grip strength in the scaphocapitate series.	<b>79</b>

	<b>Page</b>
<b>Fig. (7)</b> : Preoperative and Postoperative ROM in the scaphocapitate series.	<b>80</b>
<b>Fig. (8):</b> : Preoperative and Postoperative VAS in the scaphocapitate series.	<b>81</b>
<b>Fig. (9)</b> : Preoperative and Postoperative MMWS in the scaphocapitate series.	<b>82</b>
<b>Fig. (10)</b> : Preoperative and Postoperative MWHWS in the scaphocapitate series.	<b>82</b>
<b>Fig. (11)</b> : CT wrist showing non-union of scaphocapitate fusion.	<b>84</b>
<b>Fig. (12)</b> : Radiological osteopenia associated with CRPS.	<b>85</b>
<b>Fig. (13)</b> : Extrusion of the graft from the fusion site.	<b>85</b>

### **Case Presentation**

<b>Fig. (1)</b> : Case 1, preoperative ROM, a: flexion, b: extension.	<b>86</b>
<b>Fig. (2)</b> : Case 1, preoperative PXR showing SNAC wrist stage 2.	<b>87</b>
<b>Fig. (3)</b> : Case 1, preoperative MRI showing normal signal intensity of proximal pole of the scaphoid.	<b>87</b>
<b>Fig. (4)</b> : Case 1, immediate postoperative PXR.	<b>88</b>
<b>Fig. (5)</b> : Case 1, PXR after K-wires removal at 7 weeks postoperatively.	<b>89</b>
<b>Fig. (6)</b> : Case 1, PXR at 24 months postoperatively.	<b>89</b>
<b>Fig. (7)</b> : Case 1, last follow-up at 24 months postoperatively ROM, a: Flexion, b: Extension.	<b>90</b>
<b>Fig. (8)</b> : Case 4, preoperative ROM, a: flexion, b: extension.	<b>91</b>
<b>Fig. (9)</b> : Case 4, PXR showing SNAC wrist stage 2.	<b>91</b>
<b>Fig. (10)</b> : Case 4, intraoperative fluoroscopy showing arthroscopic partial scaphoidectomy by burr.	<b>92</b>
<b>Fig. (11)</b> : Case 4, immediate postoperative PXR.	<b>92</b>
<b>Fig. (12)</b> : Case 4, PXR at 12 months postoperatively.	<b>93</b>
<b>Fig. (13)</b> : Case 4, at 12 months postoperatively ROM, a: Flexion, b: Extension, c: minimal scar for arthroscopy portals.	<b>93</b>
<b>Fig. (14)</b> : Case 2, PXR of the wrist showing Kienböck's disease stage 3B.	<b>94</b>
<b>Fig. (15)</b> : Case 2, preoperative ROM, a: flexion, b: flexion in comparison to uninjured wrist.	<b>95</b>
<b>Fig. (16)</b> : Case 2, preoperative ROM, a: extension, b: extension in comparison to uninjured wrist.	<b>95</b>



	<b>Page</b>
<b>Fig. (17)</b> : Case 2, intraoperative fluoroscopy showing percutaneous headless compression screw application.	<b>96</b>
<b>Fig. (18)</b> : Case 2, postoperative PXR.	<b>96</b>
<b>Fig. (19)</b> : Case 2, At 16 months postoperative ROM, a: Flexion, b: Extension.	<b>97</b>
<b>Fig. (20)</b> : Case 2, PXR at 16 months postoperatively.	<b>97</b>
<b>Fig. (21)</b> : Case 6, PXR of the wrist showing Kienböck's disease stage 2.	<b>98</b>
<b>Fig. (22)</b> : Case 6, MRI of the wrist showing Kienböck's disease.	<b>99</b>
<b>Fig. (23)</b> : Case 6, preoperative ROM, a: flexion, b: extension.	<b>100</b>
<b>Fig. (24)</b> : Case 6, (a & b) Intraoperative fluoroscopic control for percutaneous headless compression screw application.	<b>100</b>
<b>Fig. (25)</b> : Case 6, (a & b) intraoperative arthroscopic control for percutaneous headless compression screw application.	<b>101</b>
<b>Fig. (26)</b> : Case 6, plain x-rays at 6 weeks postoperatively.	<b>101</b>
<b>Fig. (27)</b> : Case 6, at 12 weeks postoperatively, CT showing nonunion of SC fusion.	<b>102</b>
<b>Fig. (28)</b> : Case 6, at 6 months postoperatively, PXR showing non union.	<b>103</b>
<b>Fig. (29)</b> : Case 6, at 6 months postoperatively ROM, a: Flexion, b: Extension.	<b>103</b>
<b>Fig. (30)</b> : Case 6, at 6 months postoperatively, minimal scar for arthroscopy portals.	<b>104</b>

---

# List of Abbreviations

<b>3C</b>	Three corner
<b>4C</b>	Four corner
<b>AVN</b>	Avascular necrosis
<b>BMP</b>	Bone morphogenic protein
<b>CH</b>	Capitohamate
<b>CL</b>	Capitolunate
<b>CMC</b>	Carpometacarpal
<b>COR</b>	Center of Rotation
<b>CRPS</b>	Complex regional pain syndrome
<b>CT</b>	Computed tomography
<b>DASH</b>	Disabilities of the arm, shoulder and hand score
<b>DCR</b>	Distal carpal row
<b>DISI</b>	Dorsal intercalated segment instability
<b>DT</b>	Dart throwing
<b>DTM</b>	Dart thrower's motion
<b>ECRB</b>	Extensor carpi radialis brevis
<b>ECRL</b>	Extensor carpi radialis longus
<b>ECU</b>	Extensor carpi ulnaris
<b>FCR</b>	Flexor carpi radialis
<b>FCU</b>	Flexor carpi ulnaris
<b>Fig.</b>	Figure
<b>FRM</b>	Functional range of motion
<b>LC</b>	Lunocapitate
<b>LRLL</b>	Long radiolunate ligament
<b>MMWS</b>	Modified Mayo wrist score
<b>MRI</b>	Magnetic resonance imaging
<b>MWHWS</b>	Modified Wrightington hospital wrist score
<b>OA</b>	Osteoarthritis
<b>ORIF</b>	Open reduction internal fixation
<b>PCR</b>	Proximal carpal row
<b>PRC</b>	Proximal row carpectomy
<b>PXR</b>	Plain x-ray
<b>RBSM</b>	Rigid body spring model method RBSM
<b>RL</b>	Radiolunate
<b>ROM</b>	Range of motion
<b>RS</b>	Radioscaphoid
<b>RSCL</b>	Radioscaphocapitate ligament
<b>RSL</b>	Radioscapholunate
<b>SC</b>	Scaphocapitate
<b>SCL</b>	Scaphocapitolunate
<b>SCLH</b>	Scaphocapitolunohamate
<b>S-L, SL</b>	Scapholunate
<b>SLAC</b>	Scapholunate advanced collapse
<b>SNAC</b>	Scaphoid non-union advanced collapse
<b>STT</b>	Scaphotrapezotrapezoid
<b>TqH</b>	triquetrioamate
<b>VAS</b>	Visual analogue scale
<b>VISI</b>	Volar intercalated segment instability

---

# Arthroscopic-Assisted Limited Carpal Fusion

Osama Youssef Rabie MD, Amr Abdelkader Hammad MD, Ahmed Naeem Attiya MD,  
Abdelrahman Ahmed Diao Eldin Eldiasty MSc

## Abstract

**Background:** Osteoarthritis of the wrist is a common condition that is seen in multiple age groups. In certain patients, the wrist osteoarthritis pattern only affects a few of the intercarpal wrist joints or a portion of the radiocarpal joint. In these patients, limited carpal fusion is considered as a viable motion-preserving salvage procedure. Arthroscopic intervention combined with percutaneous fixation technique in limited wrist fusion has many potential advantages of minimal surgical damage to the supporting ligaments and capsular structures of the wrist while allowing an unimpeded view to most articular surfaces of the joints and important ligaments. This ensures a more accurate staging of the arthritis and facilitates better decision making on the most appropriate choice of fusion. The current study evaluates short term results of arthroscopic-assisted limited carpal fusion in the management of wrist arthritis as regards: time and rate of union, pain improvement, functional outcome and occurrence of complications.

**Methods:** A prospective study of arthroscopic-assisted limited carpal fusion in patients with post-traumatic limited wrist osteoarthritis including: scapholunate advanced collapse (SLAC), scaphoid nonunion advanced collapse (SNAC), Kienböck's disease, radiocarpal joint arthrosis, and scaphotrapeziotrapezoid (STT) arthritis, and chronic painful carpal instabilities with or without secondary arthritic changes. During the follow-up visits, Range of motion and grip strength were measured and recorded as percentages of the values of the unaffected extremities. MMWS, MWHWS and VAS scoring systems were used for assessment of the patients. The primary outcome was compared at 3, 6, 12, and 24 months. Dichotomous and continuous variables were compared with Statistical Program for Social Science (SPSS) version 18. The level of significance was set at  $p < 0.05$ . Quantitative data were expressed as mean  $\pm$  standard deviation (SD). Qualitative data were expressed as frequency and percentage.

**Results:** Twenty consecutive cases of arthroscopic assisted limited carpal fusion were performed in the period between October 2012 and October 2014. Eleven patients had arthroscopic assisted four corner fusion for SNAC. Mean operative time was 145.45 minutes and average follow-up was 14.91 months. All cases achieved union in an average of 7.91 weeks. Postoperatively flexion ROM increase was not significant. However, extension, grip strength and functional results as reflected by VAS, MMWS, and MWHWS were improved significantly. Nine patients had arthroscopic assisted scaphocapitate fusion for Kienböck's disease. Mean operative time was 115.56 minutes and average follow-up was 12.11 months. All cases except one achieved union in an average of 6.75 weeks. Postoperatively although the ROM increase was not significant, grip strength and functional results as reflected by VAS, MMWS, and MWHWS were improved significantly.

**Conclusions:** This cohort study demonstrates that arthroscopic assisted limited carpal fusion is a feasible option for the treatment of limited wrist arthritis with promising functional results.

**Key words:** limited carpal fusion, partial wrist arthrodesis, wrist arthroscopy

---

*Introduction*  
*&*  
*Aim of work*

---

---

# INTRODUCTION

Osteoarthritis of the wrist is a common condition that is seen in multiple age groups. If the degenerative changes have spread throughout the carpus and radiocarpal joint, treatment is generally directed to arthrodesis of the entire wrist, thus providing a stable, pain-free wrist, or total wrist arthroplasty, which eliminates pain but allows some functional arc of motion.<sup>1</sup>

In certain patients, the arthritis pattern only affects a few of the intercarpal wrist joints or a portion of the radiocarpal joint, if it has not gotten to the stage in which it affects all of the joints throughout the wrist.<sup>1</sup>

In these patients, partial wrist fusion or limited carpal fusion is considered as a motion-preserving salvage procedure for multiple painful wrist conditions. It is a good alternative particularly for those patients who would prefer a mobile functional wrist rather than solid total wrist fusion.<sup>2</sup>

A variety of partial wrist fusions have been designed in the past to address problems arising from various parts of the wrist.<sup>3,4</sup>

The fusion can take place between the radius and the proximal carpal row, between the 2 carpal rows and within the proximal carpal row.<sup>5</sup>

Because the wrist has complex articulations that provide its overall function, some motion is always lost owing to partial wrist arthrodesis. However, the maintenance of perfect congruity of the remaining joints that provide motion can provide long-term pain relief and the lack of further secondary degenerative changes.<sup>6</sup>

The operations being described in the literature and commonly in use are open surgery requiring much soft tissue dissection, including capsular and ligament incisions around the wrist to expose the carpal intervals. This may lead to iatrogenic stiffness of the joint on top of the mechanical constraint rendered by selected carpal fusion.<sup>5</sup>

The expected loss of motion can be predicted theoretically from the biomechanical models, although in practice, the final range of motion retained clinically will also rely on the degree of soft tissue contracture and the amount of compensatory hypermobility of the adjacent mobile segments. Thus, it is desirable to minimize surgical insult to soft tissue so as to maximize the motion preservation that is always the interest of both the patients and the surgeons.<sup>5</sup>

Wrist arthroscopy has steadily grown from a mostly diagnostic tool to a valuable adjunctive procedure in the treatment of myriad wrist disorders.<sup>7</sup>

Arthroscopic intervention in partial wrist fusion has potential advantages of minimal surgical damage to the supporting ligaments and capsular structures of the wrist while allowing an unimpeded view to most articular surfaces of the joints and important soft tissue elements. This ensures a more accurate staging of the arthritis and facilitates clinical decision making on the most appropriate choice of fusion. The remaining carpal motion can be maximized, and postoperative pain reduced, which favors rehabilitation. There is also cosmetic benefit with the minimal surgical scar.<sup>5</sup>

Combining with percutaneous fixation technique, arthroscopic partial wrist fusion can potentially generate the best possible functional outcome by preserving the maximal motion pertained with each type of partial wrist fusion because the effect of extra-articular adhesion associated with open surgery can be minimized.<sup>5</sup>

## **Aim of the Work**

The aim of this work is to evaluate short term results of arthroscopic-assisted limited carpal fusion in the management of wrist arthritis as regards: time and rate of union, pain improvement, functional outcome and occurrence of complications.