Research Article

Volume 4 Issue 3 – January 2017
DOI: 10.19080/OROAJ.2017.04.555640

Ortho & Rheum Open Access

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Excision of the Trapezium

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Submission: December 19, 2016; **Published:** January 23, 2017

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Original Work

- a) The Results of Excision of the Trapezium- K Mohan Iyer (Oct.1981) The Hand, Vol. 13,No. 3: 246-250.
- b) Arthrography of the Metacarpo-Scaphoid Joint following Excision of the Trapezium- K Mohan Iyer & GH Whitehouse (Oct.1981) The Hand, Vol.13,No. 3: 251-256 [1-39].

The Trapezium Surfaces

- a. Palmar Surface-Groove and a Tubercle.
- b. Dorsal Surface-Related to Radial Artery.
- c. Lateral Surface-Lateral collateral ligament of the wrist joint & capsular ligament of the carpometacarpal joint.
- d. Medial Surface-Facet for the Trapezoid.
- e. Proximal Surface-Facet for the Scaphoid.
- f. Distal Surface-Saddle shaped for the base of the first metacarpal.

Normal Wrist Joint Compartments

- a. Radiocarpal Joint.
- b. Inferior Radioulnar Joint.
- c. Midcarpal Joint.
- d. Isolated Carpometacarpal Joint the Thumb (Figure1)

Figure 1: Coronal section of the wrist joint showing joint cavities, synovial membrane, articular cartilages and interosseous ligaments.

Intercarpal Joints

- a. Joints between bones of the proximal row.
- b. Joints between bones of the distal row.
- c. Midcarpal Joint
 - i. Between these two rows of bones.
 - ii. S shaped cavity lined by synovial membrane.
 - iii. Has 2 projections proximally and 3 projections distally.

Pathology

Stage I:

- a. Pain
- b. Synovitis
- c. Local Swelling
- d. Effusion into the joint (Figure 2)

Figure 2: Pathology – X-ray.

Stage II:

- a. Severe pain
- b. Joint space narrowing
- c. Medial osteophyte (Figures 3 & 4).

Figure 3: Pathology – Stage – II.

Figure 4: Pathology – Stage – II – X-ray.

Stage III:

- Severe pain
- Marked decrease of joint space Subluxation of the metacarpal (Figure 5).

Figure 5: Stage III.

Stage IV:

- Subluxated metacarpal fixed by fibrosis & contracture
- Marked hyperextension deformity of the MCP joint Flexion deformity of the IP joint
- Pain minimal or nil Fixed adducted thumb (Figure 6).

Figure 6: Stage – IV.

Carpometacarpal Arthritis of the Thumb

- Age: 60 Years
- Sex: Women(Post Menopausal)
- Side: Right side; Both sides frequent
- Predisposing Factors:
 - Trauma (30%)
 - Developmental Anomalies
 - Occupational
 - Anatomical

Symptoms

- Severe pain-Base of the thumb
- Aggravated by movements
- Swelling over the base of the thumb
- Stiffness of the Thumb
- Weak Grip

(A)Conservative Treatment

- Physiotherapy
- Radiotherapy
- Splint
- Intra-articular Steroids

(B)Surgical Treatment

- Forage
- Intra-articular Tenodesis
- Excision of the Trapezium
- Arthrodesis
- Silicone rubber interpositional arthroplasty
- Prosthetic Replacement
 - Charcot and Leri(1926)
 - Robert(1936)
 - Forestier(1937)
 - Lasserre,Pauzat and Derennes(1949)
 - Muller (1949) and Brittain (1952) - Arthrodesis of the carpometacarpal joint of the thumb. Stressed the difficulty of obtaining a successful fusion of this small joint.
 - Dickson (1976):
 - Silicone rubber sponge interposition arthroplasty.

- b. Excellent results in 15 of the 16 wrists.
- c. Silicone promotes development of repair fibrous tissue.
- vii. Swanson (1972) - Heat molded, intramedullary stemmed silicone rubber implant. Early results not encouraging due to advancement of insertion of abductor pollicis longus with reinforcement of capsule with a slip from flexor carpi radialis.
- viii. Gervis (1949) 18 wrists with 16 good results. (1973) 12 wrists followed up for 6 to 22 years.
- ix. Goldner & Clippinger (1955) Excision of the Trapezium piece-meal.
- x. Murley (1960) 39 wrists with 36 good results. Marmor & Peter (1969) 7 wrists with 5 good results.
- xi. Sims & Bentley (1970) 27 Trapeziectomies with excellent results in 15, Good in 6, Fair in 5 & Poor in one. Incidence of 54% of patients with associated Trapezio-Scaphoid Arthritis.
- xii. Gervis (1949) 18 wrists with 16 good results.
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- xv. Goldner and Clippinger (1955) Excision of the Trapezium piece-metal.
- xvi. Marmor and Peter (1969) 7 wrists with 5 good results.
- xvii. Sims and Bentley (1970) 27 Trapeziectomies with excellent results in 15, good in 6, fair in 5 and poor in one. Incidence of 54% of patients with associated Trapezio-Scaphoid arthritis.
- xviii. Iyer (1981) 26 wrists with 25 good results.

Clinical Evaluation

- a) Name
- b) Age
- c) Sex
- d) Dominant Hand
- e) Occupation
- f) Time off work: Pre-op, Post-op & Total.
- g) Return to original occupation.
- h) History of Injury.
- i) Duration of complaints pre-op.
- j) Time since surgery.

Associated Conditions

- a) Cervical Spondylosis.
- b) Periarthritis Shoulders.
- c) Stenosing Tenovaginitis.
- d) Median nerve compression.
- i. Surgical -Incision.
- ii. Post operative management (Table 1) (Figures 7-17).

Table 1: Clinical Evaluation.

	Number of patients	Number of operations	Age (Years)	
			Average	Range
Males	9	13	67.66	56-79
Females	9	13	58.11	41-70

Figure 7: Thumb Movements.

Figure 8: Thumb Movements.

Figure 9: Thumb Movements.

Figure 10: Thumb Movements.

Figure 11: Thumb Movements.

Figure 12: Thumb Movements

Figure 13: Thumb Movements.

Figure 14: Thumb Movements.

Figure 15: Thumb Movements.

Figure 16: Thumb Movements.

Figure 17: Thumb Movements.

Results

Thumb Movements:

- I. Abduction
 - a) Normal range + Power -18 wrists
 - b) Less than 50% -8 wrists
- II. Opposition
 - a) Normal range + Power -14 wrists
 - b) N.range+50%Power - 9 wrists
 - c) Less than 50% R+P - 3 wrists
- III. Adduction
 - a) Normal Power - 25 wrists
 - b) Poor - 1 wrist
- IV. Circumduction
 - a) Normal -25 wrists
 - b) Poor - 1 wrist

Associated Features:

- a) Cervical Spondylosis -13/18 patients.
- b) Periarthritis Shoulders -9/18 patients.
- c) Stenosing Tenovaginitis -3/18 patients.
- d) Median nerve compression -4/18 patients (Surgical Decompression in 2 patients)
 - i. Follow up- 2 months to 14 years
 - ii. Duration of complaints pre-operative- 1 year to 10 years
 - iii. Total time off work- 3 months
 - iv. Return to original occupation- 11 patients
 - v. History of injury- 7/26 wrists
 - vi. Dominant hand- 13/18 patients
 - vii. Hand span
 - a) Bilateral cases (8 patients)- equal
 - b) Rest (10 patients)- 1.25 cms (average)

- viii. Shortening of the thumb
 - a) Bilateral cases (8 patients) - equal
 - b) Rest (10 patients) - 1 cm (average)
- ix. Intermetacarpal angle
 - a) Normal -23/26 wrists
 - b) Less than normal -3/26 wrists
- e) Functioning tendons of Flexor carpi radialis and Flexor pollicis longus =26/26 wrists.
- f) Decreased sensations over the dorsum of the base of the thumb =3/26 wrists.
- g) Keloid formation = 5/26 wrists.
- h) Palpable Neuroma = None.
- i) Opposition Grip:
 - a) Normal Power = 6 wrists
 - b) Decreased power = 20 wrists
- j) Pinch Grip: (Figures 18-23).

Figure 18: Graph of Opposition Grip.

Figure 19: Graph of Pinch Grip.

Figure 20: Normal Power.

Figure 21: Pinch Grip.

Figure 22: Grip.

Figure 23: Graph of Patient Satisfaction vs number of hands

Radiographic Assessment

- i. Level of first metacarpal base.
- ii. Accessory Ossicles.
- iii. Radiologic gap.
- iv. Telescoping.
- v. Stress views.
- vi. Degenerative changes:
 - a) Base of first metacarpal
 - b) Distal Scaphoid
 - c) Elsewhere in the carpus

Radiographic Features

- a) Telescoping =14 wrists (55%)
- b) Accessory Ossicles = 9 wrists (40%)
- c) Radiological Gap = 1mm to 6mm
- d) Degenerative changes:
 - i. Base of first metacarpal =14 wrists
 - ii. Distal Scaphoid = 8 wrists
 - iii. No changes =11 wrists (Figure 24).

Figure 24: Radiographic Features.

- e) Residual Cartilage:

- i. Base of first MC -Nil in 3 wrists
- ii. Present in 22 wrists Distal Scaphoid - Nil in 2 wrists
- iii. Present in 23 wrists 6.Lateral subluxation of 1st MC on Abduction
- iv. Marked subluxation in 3 wrists Moderate subluxation in 22 wrists (Figure 25).

Figure 25: Radiographic Features.

- f) Maintenance of joint space despite subluxation of the 1st MC on the Scaphoid on radial deviation of the wrist.
- g) Stress views of the wrist:
 - i. No changes = 9 wrists
 - ii. Widening of the Sc-Trap.Jt =12 wrists
 - iii. Widening of the Sc-Cap.Jt = 6 wrists
 - iv. Widening of gap between the bases of 1st & 2nd MC's = 6 wrists (Figures 26-28).

Figure 26: Radiographic Features.

Figure 27: Radiographic Features.

Figure 28: Radiographic Features.

Arthrography of the Metacarpo-Scaphoid joint

Technique (Figures 29 & 30)

Figure 29: Arthrography of the Metacarpo-Scaphoid joint.

Figure 30: Arthrography of the Metacarpo-Scaphoid joint – Technique.

Arthrographic assessment

- a) Amount of dye injected.
- b) Ease of location of the joint & injection.
- c) Residual articular cartilage over:
 - i. Base of the first metacarpal.
 - ii. Distal Scaphoid.

Arthrographic Assessment

- d) Joint Features☐
 - (A) Isolated.
 - (B) Communications-
 - (C) Midcarpal
 - (D) Radiocarpal
 - (E) Radioulnar
 - (F) Tendon Sheaths
 - (G) Pouch between 1st & 2nd metacarpal bases
- e) **Stress Views** (Figures 31 & 32).

Figure 31: Arthrographic Assessment.

Figure 32: Arthrographic Assessment.

Arthrographic Features

- a) Distinct Joint Space - 25 wrists
- b) Comm. with midcarpal joint - 10 wrists
- c) Comm. with radiocarpal joint - 2 wrists
- d) Comm. with distal RU joint - 1 wrist
- e) Comm. with tendon sheaths - 4 wrists
- f) Contour-Irregular & small - 16 wrists
- i. Regular & larger - 9 wrists (Figures 33-36).

Figure 33: Arthrographic Features.

Figure 34: Arthrographic Features.

Figure 35: Arthrographic Features.

Figure 36: Arthrographic Features.

Conclusion

- i. Excision of the Trapezium gives good results with respect to relief of pain.
- ii. Good hand function despite some reduction in the power of Opposition grip and Pinch grip.
- iii. Carpal Instability or Laxity may account for decreased Opposition grip & Pinch grip.
- iv. Distinct joint space
 - a) Small & Irregular within 6 months of Surgery
 - b) Large & Regular thereafter
 - c) Marked subluxation indicates weak grip
- v. Late deterioration of pseudoarthrosis in one patient

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DOI:10.19080/OROAJ.2016.03.555640

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