



Surgical Management of Tennis Elbow- A Comparative Study

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Abstract

Introduction: Tennis elbow denotes a symptom complex characterized by pain in the lateral epicondylar area of the elbow which is accentuated by active contraction or passive stretching of muscles originating from the involved epicondyle - also known as lateral epicondylitis.

Materials and Methods: A prospective study of 80 cases of tennis elbow not responding to conservative treatment was done at the Department of Orthopaedics, Govt Medical College, Thiruvananthapuram.

Results: At one year excellent results were found in 35% of closed tenotomy, 45% of open tenotomy, 50% of Nirschl's release and 55% of Boyd and McLeod release. Good results were obtained in 45% of closed tenotomy, 40% of open tenotomy, 35% of Nirschl's release and 40% of Boyd and McLeod release. Fair results were obtained in 10% each of closed tenotomy, open tenotomy and Nirschl's release, 5% of Boyd and McLeod release. Poor results were obtained in 10% of closed tenotomy, 5% each of open tenotomy and Nirschl's release. There was no poor result in Boyd and McLeod release.

Conclusion: Surgery is indicated in tennis elbow resistant to conservative treatment. Percutaneous release and open extensor release produce nearly as good result as Nirschl's release and Boyd and McLeod release. Open release produced slightly better results than percutaneous release as the aponeurosis is seen and released. Most of the patients benefited from surgery.

Keywords: Tennis elbow, Nirschl's release, Boyds and McLeods release.

Introduction

Tennis elbow denotes a symptom complex characterized by pain in the lateral epicondylar area of the elbow which is accentuated by active contraction or passive stretching of muscles originating from the involved epicondyle - also known as lateral epicondylitis or epicondyalgia. It was first described by Renton in 1830 and later on by Runge in 1873. The condition was first named by Morris (1882) who called it lawn tennis elbow. Although initially described in tennis players, it is found in others and may be occupation related.

Housewives form the major group. It is a common problem in office orthopaedics, and is four times more common in fourth decade of life. Similar involvement of common flexor origin at medial epicondyle is called golfer's elbow. Tennis elbow is seven times more common than golfer's elbow. The condition is usually self limiting and majority of patients improve with time and rest. It usually resolves within one year when it occurs under the age of 60 years. It is usually the patient with chronic symptoms of more than several months who seek more vigorous treatment.

On examination there is localized tenderness, positive Cozen's test and positive Mill's manoeuvre. Finger snapping test may be positive. Thus the diagnosis is easy but the pathology remains obscure. It is believed to be an enthesopathy of common tendinous origin of extensor muscles of forearm in particular extensor carpi radialis brevis (ECRB) on lateral epicondyle of humerus. Also implicated are painful annular ligament, hypertrophied synovial fringe between radial head and capitellum, calcified deposit within common extensor tendon and inflamed adventitious bursa.

The major differential diagnosis are radiohumeral arthritis and entrapment of posterior interosseus nerve. Patients with tennis elbow often have soft tissue rheumatism at other sites such as carpal tunnel syndrome, frozen shoulder, plantar fasciitis, De Quervain's disease etc. Roentgenogram is usually negative. Ultrasound and MRI may show changes. Histopathology shows angiofibroblastic proliferation in the origin of ECRB.

The treatment of choice is conservative. It includes rest, heat, application of ice, massage, change of occupation, ultrasound, short wave diathermy, TENS, radio therapy, acupuncture, laser, local and systemic NSAIDS, local anaesthetics, local steroids and manipulation.

Surgery is recommended in patients with recurrences and those who have not responded to conservative treatment. About 3.3 to 8% of patients require surgery. Surgical treatment includes simple lateral extensor release to more invasive procedures like resection of annular ligament, excision of bursa and synovial fringe, epicondylectomy, denervation of lateral epicondyle, selective release or lengthening of ECRB and decompression of posterior interosseus nerve.

The aim of the present study is to make a comparative study and to analyse the results of closed tenotomy, open tenotomy, Boyd and McLeod release and Nirschl's release.

Materials and Methods

A prospective study of 80 cases of tennis elbow not responding to conservative treatment were done at the Department of Orthopaedics, Govt Medical College, Thiruvananthapuram..

Aims of the study

To make a comparative study of various surgical procedures in treatment of tennis elbow not responding to conservative treatment and to analyse the results. The surgical procedures studied are

1. Percutaneous release of Baumgard and Schwartz.
2. Modified Baumgard and Schwartz release - open release of extensor origin.
3. Nirschl's release
4. Boyd and McLeod release

Patient selection

Patients with tennis elbow not responding to local rest, analgesic and at least two injections of steroid were selected.

Selection of surgery

In patients with localized tenderness just in front of lateral epicondyle, either of the first three operations were done. In patients with positive finger snapping test Nirschl's release was done. In patients with diffuse tenderness Boyd and McLeod release was done. Garden's procedure was done in one patient.

During clinical examination the age, sex and occupation of the patient were noted. The duration, mode of onset and degree of pain was asked. Pain was classified into

- i. Severe - pain on mild activity and at rest
- ii. Moderate - pain on moderate activity and occasional pain on heavy activity
- iii. Mild - occasional pain on heavy activity

The side of involvement was noted. Associated complaints and illnesses were looked for. Enquiries were made of previous treatment.

On examination, site of tenderness was noted. Cozen's test, Mill's manoeuvre and finger

snapping test were done. Movements of elbow were noted.

Neurological examination of the limb was done to look for posterior interosseus nerve entrapment, referred pain due to cervical spondylosis and thoracic outlet syndrome. Radial artery pulsations were looked for to rule out cervical rib and other causes of thoracic outlet obstruction.

Any cubitus valgus was noted. Other evidence of enthesopathy like, supraspinatus tendinitis, bicipital tendinitis, De Quervian's disease, plantar fasciitis were looked for in all cases.

Investigations

Routine AP and lateral roentgenograms of elbow were taken. EMG and NCV were done in cases of suspected supinator syndrome.

Peroperative findings were noted. Any degeneration, calcification, synovial hypertrophy, softening of radial head were looked for.

After treatment - The arm was routinely immobilized in long arm slab with elbow in 90° flexion and, forearm and wrist neutral for 10 days. Sutures were removed at 10 days and gradually mobilized. Earlier mobilization produced severe pain at operation site, hence not done.

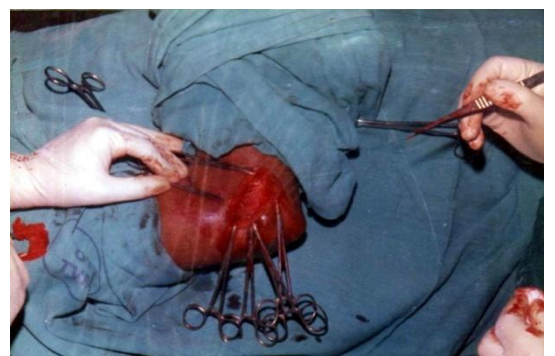
Complications

Both immediate and late post operative complications were noted. Follow up
Follow up was done at 10 days, 6 weeks, 6 months and at 1 year. At each follow up subjective assessment was done using Nirschl's grading system.

- I. Excellent - Full return to activity with no pain
- II. Good - Full return to all activity, with occasional mild pain
- III. Fair - Normal activity with no pain, significant pain with heavy activity and 75% or better subjective overall improvement in pain.
- IV. Poor - No relief of preoperative symptoms and recurrence of pain.

- V. Objective assessment done by Cozen's test, Mill's manoeuvre and finger snapping test. Active and passive movements of elbow were noted.

Nirschl's procedure





Sex distribution

Sex	Number	Percentage
Males	34	42.5%
Females	46	57.5%

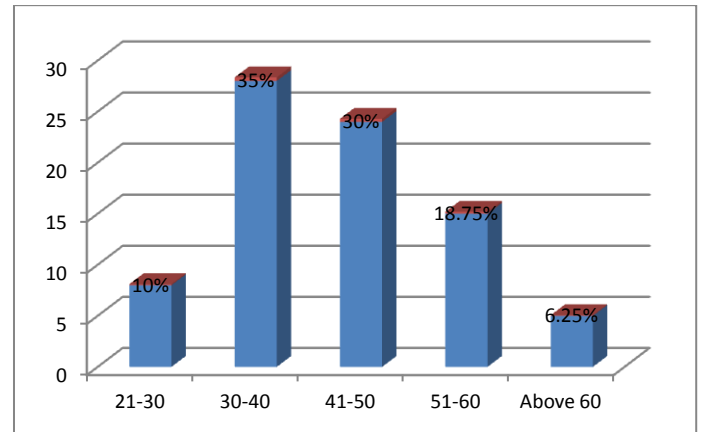
Side of involvement

Side	Number	Percentage
Right	68	85%
Left	10	12.5%
Bilateral	2	2.5%

Garden's procedure



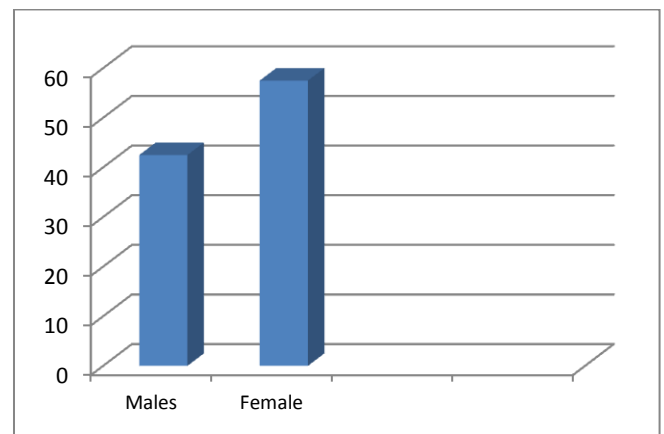
Age Distribution



Closed Tenotomy



Sex Distribution



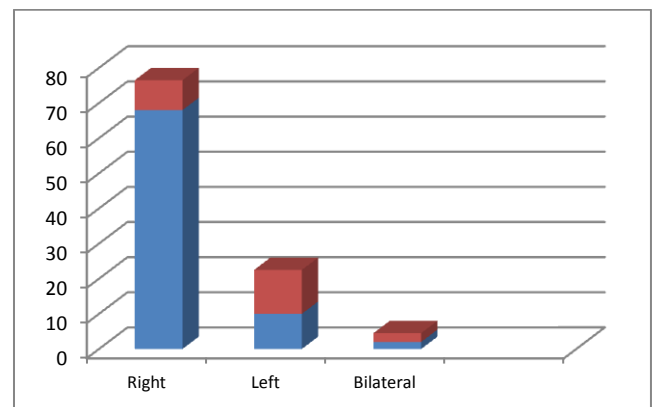
Observations

The following observations were noted.

Age distribution

Age group	Number	Percentage
21-30	8	10%
31-40	28	35%
41-50	24	30%
51-60	15	18.75%
Above 60	5	6.25%

Side of involvement



Occupation

Occupation	Number	Percentage
Housewives	40	50%
Labourers	13	16.25%
Fishermen	9	11.25%
Office job	5	6.25%
No work	8	10%
Other jobs	5	6.25%

Duration of complaints

Duration	Number	Percentage
less than 6 months	31	38.75%
More than 6 months	49	61.25%

Associated complaints

Illness	Number	Percentage
Cervical spondylosis	16	20%
Supraspinatus tendinitis	12	15%
Golfer's elbow	7	8.75%
De Quervian's disease	4	5%
Plantar fasciitis	4	5%

Roentgenogram

Finding	Number	Percentage
Calcification Roughening of lateral epicondyles	2	2.5%
(Periostitis)	2 4	5%

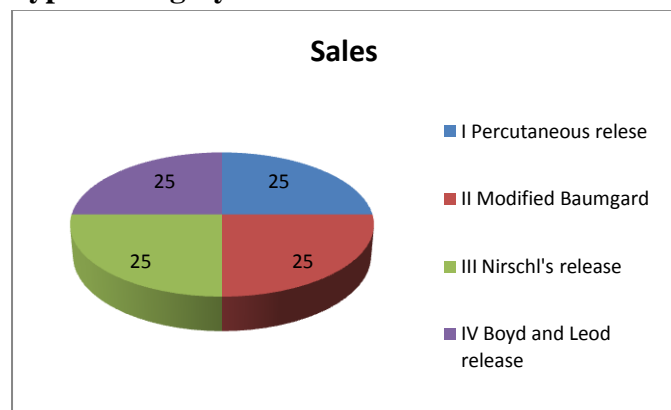
Number of steroid injection prior to surgery

Number of injections	Number	Percentage
Two	56	70%
Three	13	16.25%
More than three	11	13.75%

Type of surgery

Type	Number	Percentage
I Percutaneous release	20	25%
II Open release	20	25%
III Nirschl's release	20	25%
IV Boyd and McLeod release	20	25%

Type of Surgery



Per Operative Findings

Finding	Number	Percentage
Degeneration of origin of ECRB	18	22.5%
Calcification	2	2.5%
Synovial hypertrophy	3	3.75%

Operating Time

Surgery	Time
I	5 mts
II	15 mts
III	30 mts
IV	45 mts

Post Operative Complications

Complication	Total	Surgery			
		I	II	III	IV
Wound infection	9 (11.25%)	0	1	3	5
Stitch abscess	3 (3.75%)	0	0	1	2
Recurrence	4 (5%)	2	1	1	0

Results

Patients were reviewed at 10 days, 6 weeks, 6 months and 1 year.

At 10 days, assessment was difficult due to persistantpost surgical pain.

Assessment at 6 weeks

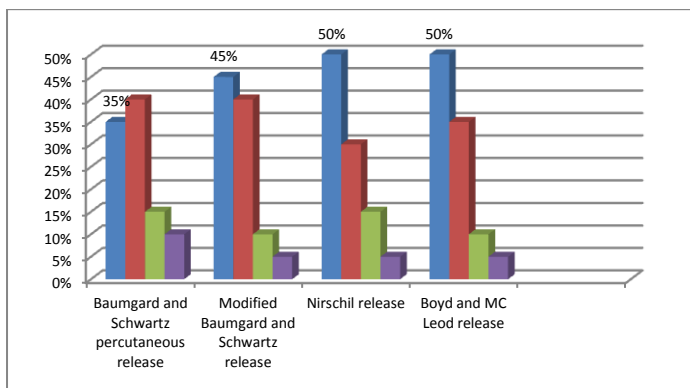
Surgery	Result			
	Excellent	Good	Fair	Poor
I Baumgard and Schwartz percutaneous release	7(35%)	8(40%)	3(15%)	2(10%)
II Modified Baumgard and Schwartz release	9(45%)	8(40%)	2(10%)	1(5%)
III Nirschl's release	10(50%)	6(30%)	3(15%)	1(5%)
IV Boyd and McLeod release	10(50%)	7(35%)	2(10%)	1(5%)

Assessment at 6 months were comparable to that at 6 weeks.

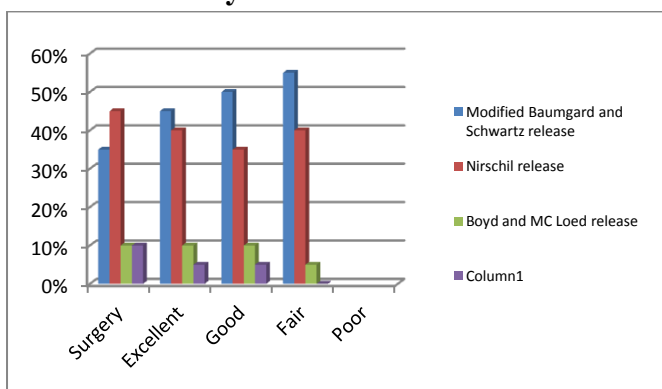
Assessment at 1 year

Surgery	Excellent	Good	Fair	Poor
I	7(35%)	9(45%)	2(10%)	2(10%)
II	9(45%)	8(40%)	2(10%)	1(5%)
III	10(50%)	7(35%)	2(10%)	1(5%)
IV	11(55%)	8(40%)	1(5%)	0

Assessment at 6 weeks



Assessment at 1 year



Discussion

Tennis elbow was found to be a disease of middle age. Most common in 30-50 year age group (65%).

Females were more affected than males (57.5 : 42.5).

Right side was more commonly affected than left, (right side 85%). Bilateral involvement may be seen (2.5%). One side was affected early. In both cases in the study right side was affected first.

The disease may be occupation related. Housewives form the largest group (50%) followed by labourers and fishermen. Occupation related tennis elbow was seen in younger age group in, third and fourth decades.

The duration of complaints was more than 6 months in majority of cases (61.25%).

Associated degenerative diseases may be found. Cervical spondylosis was found to be quite common (20%). It may be due to similar age group for both diseases. Also radiating pain from cervical spondylosis comes under the differential diagnosis of tennis elbow.

Other enthesopathy may be found associated with the disease. Supraspinatus tendinitis, Golfer's elbow, De Quervain's disease and plantar fasciitis were seen. They were treated with analgesics and local steroids.

Roentgenograms were normal in most of the cases. 2.5% showed calcification at extensor origin and 5% showed features suggestive of iostitis.

70% had two steroid injections previously. More than two steroid injections were usually referred from other hospitals.

Each type of surgery was done in twenty patients. Garden's procedure was done in one patient with good result. More cases could not be done due to patient non compliance.

The average operating time was 5 mts for closed tenotomy, 15 mts for open tenotomy, 30 mts for Nirschl's release, 45 mts for Boyd and McLeod release.

There was only one case of wound infection in open tenotomy, 3 cases in Nirschl's release and 5 cases in Boyd and McLeod release. All infections were adequately controlled with antibiotics. Stitch abscess in 1 case of Nirschl's release and in 2 cases of Boyd's release were also controlled with antibiotics. No other major complication was noted.

Results

At 6 weeks, excellent result was achieved in 35% of closed tenotomy, 45% of open tenotomy, 50% of Nirschl's release as well as Boyd and McLeod release. Good results were found in 40% of open tenotomy, 40% of closed tenotomy, 30% of Nirschl's release and 35% of Boyd and McLeod release. Fair results were obtained in 15% of closed tenotomy, 10% of open tenotomy, 15% of Nirschl's release and 10% of Boyd and McLeod release. Poor results were obtained in 10% of closed tenotomy and 5% each of open tenotomy, Nirschl's release and Boyd and McLeod release. Assessment at 6 months showed similar result to that at 6 weeks.

At one year excellent results were found in 35% of closed tenotomy, 45% of open tenotomy, 50% of Nirschl's release and 55% of Boyd and McLeod release. Good results were obtained in 45% of closed tenotomy, 40% of open tenotomy, 35% of Nirschl's release and 40% of Boyd and McLeod release. Fair results were obtained in 10% each of closed tenotomy, open tenotomy and Nirschl's release, 5% of Boyd and McLeod release. Poor results were obtained in 10% of closed tenotomy, 5% each of open tenotomy and Nirschl's release. There was no poor result in Boyd and McLeod release.

There were 4 cases of recurrence following surgery. Two in case of closed tenotomy, one each in case of open tenotomy and Nirschl's release, none in case of Boyd and McLeod release. The patients with recurrence were investigated for nerve entrapment syndrome. EMG and NCV studies were normal in all cases. Repeat roentgenograms were also normal. The patients were unwilling for a reexplorative surgery.

Hence they were all treated with local steroid and Mill's manoeuvre. All had fair results at follow up. Wanivenhaus et al (1986) in a study of 48 cases of epicondylitis humeroradialis treated with Wilhelm operation had satisfactory results in 93.2% of cases.

Cabot (1987) found contracture of anterolateral capsule of elbow at surgery which explained the pain with extension. Release of the capsule with the extensors provided relief in 87% of patients.

Makai (1989) preferred Boyd's operation, and reports recurrence only in one out of eleven patients.

Benassy (1985) treated tennis elbow by ablation of humeroradial meniscus.

Yerger (1985) showed that percutaneous extensor tenotomy in chronic tennis elbow can be done as an office procedure.

Christensen (1985) demonstrated a modified Bosworth technique for treatment of tennis elbow.

Calvert et al (1985) showed that simple lateral release in 37 patients achieved pain relief in 33 patients (89%).

Saillant et al (1989) performed release of epicondylar muscles with or without arthrotomy depending on the clinical symptoms; in 126 cases. 112 cases have been successful in sportsmen presenting with an early lesion.

Tan et al (1989) made a retrospective study of 28 cases treated with modified Bosworth's operation. 91.7% reported excellent or good results.

Jalovaara et al (1989) did decompression of posterior interosseus nerve in 111 cases and obtained improvement in 85% of cases and 30% were almost completely relieved.

Leach et al (1987) showed that debridement of damaged portions of ECRB was beneficial.

Wanivenhaus (1991) advised a combination of Garden and Wilhelm procedures in treating patients suffering from chronic tennis elbow syndrome.

Marcial (1991) did debridement of the radial head and excision of apophysis in 100 cases. 90% had good results.

Wittenburg (1992) advised intraarticular surgery like Boyd and McLeod in patients with incomplete pain relief after a test injection of local anaesthetic at the sore spot of the epicondyle. In case of complete pain relief, Wilhelm denervation of epicondyle was done.

Verhaar et al (1993) made a prospective study of lateral extensor release in sixty three patients. At five years 56% had excellent result, 33% had good result, 7% had fair result and 4% had poor result. They concluded that simple lateral extensor release that can be performed in an outpatient sitting may be regarded as the operative procedure with which other operations should be compared.

Strangl et al (1993) recommend Wilhelm's procedure in patients resistant to conservative therapy.

Daubinet (1993) reported 72 cases of epicondylar tenotomy done in refractory tennis elbow. He had good result in 97% of cases.

Newey et al (1994) advise surgery at an earlier stage than is currently employed, for better results.

Conclusion and Relevance

Surgery is indicated in tennis elbow resistant to conservative treatment. Percutaneous release and open extensor release produce nearly as good result as Nirschl's release and Boyd and McLeod release.

Open release produced slightly better results than percutaneous release as the aponeurosis is seen and released. Most of the patients benefited from surgery.

The simple extensor release is easier to perform.

It take less operating time.

It has better patient compliance.

It has fewer complications.

Recurrence rate is slightly higher.

When the finger snapping test is positive, Nirschl's release is advised and when tenderness is diffuse Boyd and McLeod release is advocated.

Relevance

A simple extensor release may be done instead of a more extensive procedure in most cases of tennis elbow not responding to conservative treatment. A percutaneous tenotomy can be done as an out patient procedure.

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