CLINICAL ARTICLE

Cubital tunnel syndrome:
Simple decompression versus decompression and anterior subcutaneous transposition

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Abstract

Background:
The procedure of choice in the surgical treatment of cubital tunnel syndrome remains controversial. The aim of this study is to report the results of simple decompression and decompression with anterior subcutaneous transposition.

Methods:
A retrospective review (July 2002–January 2007) using the Bishop Score to assess outcome. A total of 102 procedures (91 patients, 11 bilateral) were performed with a minimum of 9 months' post-operative follow-up. The procedure was selected intra-operatively. All cases were operated by the senior author (MC).

Results:
In the simple decompression group (n=47, average age 45.9 years), the average Bishop Score was 11.3 (5–13) with an average time to recovery of 3.7 months (1–6). Good to excellent results were obtained in 94% and fair results in 6%.

In the anterior transposition group (n=55, average age 43.3 years) the average Bishop Score was 10.6 (5–13) with average time to recovery of 4.2 months (1–6). Good to excellent results were obtained in 93% and fair results in 7%. Complications included subluxation of the ulnar nerve in two cases, one wound dehiscence and one post-operative haematoma.

Conclusions:
The outcome in both groups was the same. Recovery is often prolonged. It took 3–6 months for 69% of patients to recover. Younger patients recovered sooner and the transposition and elderly groups took longer to recover. Simple decompression is adequate unless the nerve is unstable or the bed unsuitable.

Introduction

Cubital tunnel syndrome is the second most common compressive neuropathy of the peripheral nerves.[1] It results from compression of the ulnar nerve along its course around the elbow. Surgical decompression remains the mainstay of treatment where conservative management has failed. There are two surgical options, namely simple decompression and decompression with anterior transposition of the ulnar nerve. Transposition of the nerve may be done subcutaneously, submuscularly, or intramuscularly with medial epicondylectomy.

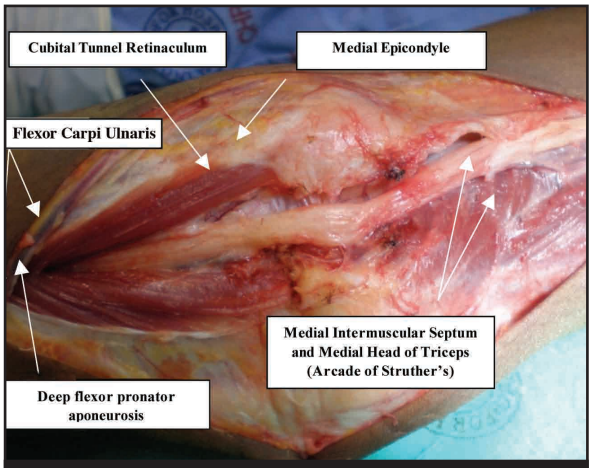

Figure 1:
Anatomy of ulnar nerve around the elbow illustrating potential areas of compression

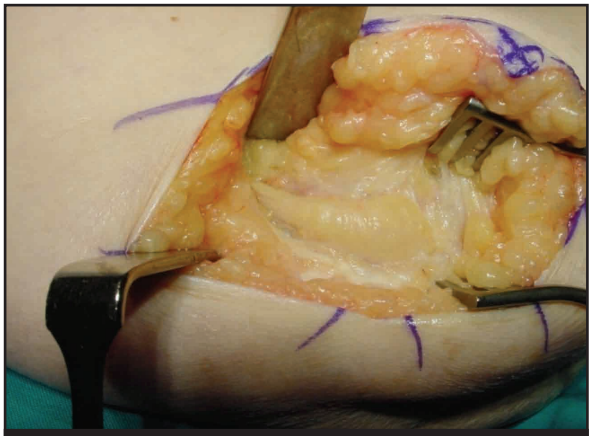

Figure 2:
Lipoma located around the ulnar nerve causing compression

Figure 3:
Anomalous muscle – anconeus epitrochlearis

The procedure of choice, however, still remains controversial. The aim of our study was to evaluate the outcome of simple decompression and decompression with anterior subcutaneous transposition.

It is important to appreciate the anatomy of the ulnar nerve around the elbow in order to release all potential points of compression *(Figure 1)*. Patients present with altered sensation, paraesthesiae and/or pain in the distribution of the ulnar nerve in the hand, i.e. the little finger and ulnar half of the ring finger. They may also complain of pain around the elbow associated with clumsiness or weakness in the hand. In more advanced cases wasting of the intrinsic muscles may become noticeable on the affected side.

Compression of the nerve may be due to increased contents within Osborne's canal, e.g. lipoma *(Figure 2)*; anomalous muscles *(Figure 3)*; tumours *(Figure 4)*; or a decrease in size of the cubital tunnel, e.g. in valgus deformities, fractures or osteophyte formation. Cubital tunnel syndrome may also be associated with systemic conditions such as diabetes mellitus and rheumatoid arthritis. The majority of cases, however, remain idiopathic. Repetitive or prolonged elbow flexion has also been implicated in the development of cubital tunnel syndrome due to the increased excursion of the nerve and elevated intra/extra-neural pressures.[2,3] The subcutaneous course of the ulnar nerve around the elbow and through Osborne's canal also predisposes it to direct compression and injury. The severity of the lesion may be classified according to Dellon as mild, moderate or severe.

Materials and methods

One hundred-and-forty-three patients underwent either simple decompression or decompression with subcutaneous transposition of the ulnar nerve between March 2002 and January 2007. Of these a total of 91 patients underwent retrospective review and were included in the study. These included 11 patients who underwent bilateral decompressions (n=102). The minimum post-operative follow-up was 9 months.

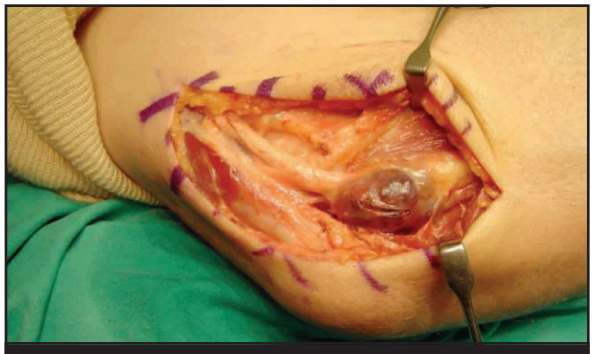

Figure 4:
Tumour causing compression and an unsuitable bed for the ulnar nerve

Table I:
Distribution between the two groups and demographics

	Simple decompression	Anterior subcutaneous transposition
Total	47	55
Male	16 (34%)	28 (51%)
Female	31 (66%)	27 (49%)
Average age	45.9 years (19–78)	43.3 years (20–68)

Table II:
Bishop's score – subjective and objective assessment

1. Satisfaction	
Satisfied	2
Satisfied with reservation	1
Dissatisfied	0
2. Improvement	
Better	2
Unchanged	1
Worse	0
3. Severity of residual symptoms	
Asymptomatic	3
Mild	2
Moderate	1
Severe	0
4. Work status	
Working or able to work at previous job	1
Not working secondary to neuropathy	0
5. Leisure	
Limited	0
Unlimited	2
6. Strength	
Both grasp and pinch > 80% of normal side	2
Either grasp or pinch (not both) <80%	1
Both grasp and pinch reduced < 80%	0
7. Sensibility (2 point discrimination)	
Normal <5 mm	1
Abnormal >5 mm	0
Maximum	13

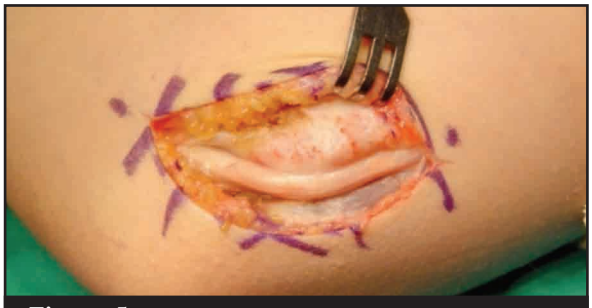

Figure 5:
Simple decompression – incision 3–4 cm centred over the medial epicondyle of the humerus

Figure 6:
External epineurolysis in situ

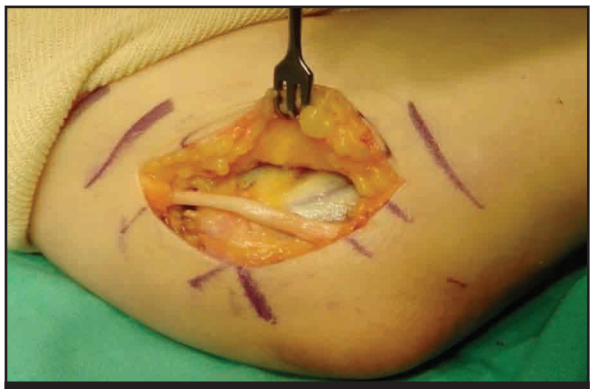

Figure 7:
Anterior subcutaneous transposition

The distribution of patients is illustrated in *Table I*. The diagnosis was made on history and clinical examination with confirmatory nerve conduction studies where indicated. All patients were operated on by the senior author (MC).

The Bishop's score *(Table II)* was used to assess outcome. A score of 10–13 was classed as excellent, 7–9 as good, 4–6 as fair and 0–3 as poor. Included in the patient questionnaire was the time to recovery in months.

The decision whether to transpose the nerve is made intraoperatively and is done only if the nerve is unstable (subluxation of the nerve on flexion and extension of the elbow) or if the nerve bed is unsuitable (e.g. after excision of tumour or inflammatory tissue).

The surgical approach in all cases was through a 3 to 4 cm curved incision centred over a point just posterior to the medial epicondyle of the humerus *(Figure 5)*. Taking care to protect the medial cutaneous nerve of the forearm at the distal end of the incision, dissection down to and release of Osborne's canal is performed. External neurolysis of the nerve is carried out in situ *(Figure 6)*. When the nerve is transposed, an adequate pocket must be made in the anterior subcutaneous tissues *(Figure 7)*, including release of the medial intermuscular septum proximally and limited fasciotomy where the nerve enters the flexor muscles of the

Figure 8:
Fascial sling attached from the cubital tunnel retinaculum anteriorly to prevent posterior subluxation of the ulnar nerve after transposition

forearm distally, flexor carpi ulnaris and deep flexor – pronator aponeurosis *(Figure 1)*. The tourniquet is released, haemostasis secured and the wound closed in layers. Where anterior transposition of the nerve has been performed sutures are placed in the subcutaneous tissues to prevent posterior subluxation of the nerve *(Figure 8)*.

After decompression it is important to test for nerve tension in full elbow flexion and extension, particularly after transposition as there may be kinking of the nerve with inadequate release proximally or distally.

All patients receive a bulky dressing post-operatively and are allowed to mobilise within the confines of a collar and cuff on day 1. Physiotherapy including scar massage, nerve glides and nerve slide exercises is started following removal of skin sutures on the eighth post-operative day. The nerve glide and slide is done with the shoulder in abduction (90°) and gently flexing and extending the elbow and wrist until the patient experiences any symptoms in the hand. These are continued as a home programme three times a day and approximately 15 minutes per session. These exercises help prevent scarring in the bed and around the nerve, hence improving outcome and prevention of recurrence. The post-operative protocol was the same in both groups and statistical analysis was assessed using the Mann Whitney and T-tests.

Results

Ninety-one patients underwent surgical decompression with bilateral releases performed in 11 cases (n=102). The simple decompression group consisted of 47 cases and the anterior transposition group 55 cases. The minimum post-operative follow-up was 9 months and the longest was 70 months. In the simple decompression group there were 39 (83%) excellent, 5 (11%) good and 3 (6%) fair in the post-operative Bishop's score *(Table III)*. There were no poor results.

Table III:
Summary of Bishop's score results for SD and AST

	Simple decompression (SD) n=47	Anterior subcutaneous transposition (AST) n=55
Excellent	39 (83%)	43 (78%)
Good	5 (11%)	8 (15%)
Fair	3 (6%)	4 (7%)
Average	11.4 ± 2.1	10.6 ± 2.1

Table IV:
Summary of time to recovery (months)

Months	Simple decompression (SD) n=47	Anterior subcutaneous transposition (AST) n=55
1	9 (19%)	6 (11%)
2	7 (15%)	7 (13%)
3	13 (28%)	7 (13%)
4	1 (2%)	5(9%)
5	0	3 (5%)
6	17 (36%)	27 (49%)
Average	3.6 ± 2.0 months	4.3 ± 1.9 months

Table V:
Summary of Bishop's score and time to recovery for the two groups

	Bishop's score (average)	Time to recovery (average – months)
Simple decompression	11.4	3.6
Anterior subcutaneous transposition	10.6	4.3
P-value	0.16	0.61

In the anterior subcutaneous transposition group there were 43 (78%) excellent, 8 (15%) good, 4 (7%) fair and no poor results *(Table III)*. The average time to recovery was 3.6 ± 2.0 months for the simple decompression group and 4.3 ± 1.9 months for the transposition group. A significant number of patients, 31 (66%) in the simple decompression group and 42 (76%) in the transposition group, required 3–6 months for recovery post-operatively *(Table IV)*. The time to recovery and the Bishop's score of the two groups was not statistically significant *(Table V)*. Both groups therefore had similar outcomes. Complications included two subluxing nerves in the simple decompression group, and one post-operative haematoma and one wound dehiscence in the transposition group.

Table VI:
Comparison of simple decompression and anterior subcutaneous transposition

Simple decompression	Anterior subcutaneous transposition
Less invasive	Wider exposure
Shorter operative time	Longer operative time
Earlier post-op mobilisation	Delayed mobilisation

Discussion

Proponents of the different methods of ulnar nerve decompression in the treatment of cubital tunnel syndrome have reported varying results. There are few prospective randomised trials comparing simple decompression (SD) with decompression and anterior subcutaneous transposition (AST).[4,5]

Nabhan *et al*[4] in a prospective randomised trial (32 – SD and 34 – AST) found no significant difference in outcome between the two groups.

Bartels *et al*,[5] in a randomised prospective study with 75 patients in the SD group and 77 patients in the AST group, reported equivalent outcomes in both groups. Their complication rate was, however, higher in the AST group and was statistically significant (9.6% for SD and 31.1% for AST).

Biggs *et al*[6] and Gervasio *et al*[7] comparing simple decompression and submuscular transposition in randomised controlled trials also found no significant differences between the two groups.

Nathan *et al*[8] in a retrospective review of 131 patients (164 nerves), with an average follow up of 4.3 years (0.8–12 years), demonstrated 79% (130/164) good or excellent results for simple decompression. Nathan[8] also demonstrated that simple decompression was adequate, even for conditions not recommended in the literature.

In our series we demonstrated similar outcomes between the SD and the AST groups

Lascar *et al*[9] demonstrated 89% (47/53) excellent results in their series of anterior subcutaneous transposition using an early post-operative active-mobilisation protocol. Early post-operative mobilisation prevents scar formation in the nerve bed and therefore improved results. Usually the AST group is immobilised for longer periods due to the wider surgical dissection. In our series we demonstrated similar outcomes between the SD and the AST groups. This correlates with similar reports in the literature.

The two subluxing nerves in the SD group is a recognised complication of this surgical procedure and Nathan[8] found it to be a statistically significant cause of failure in their series (2.4%). The traditional wider surgical dissection for AST has been shown to disrupt vascular supply to the ulnar nerve[10] and therefore gives less satisfactory results. The time to recovery in our SD group averaged 3.6 months compared to 4.3 months in our AST group. Although there is no statistical significance between the two groups, it is important to explain to patients that nerve recovery with resolution of symptoms may take up to six months. In our SD group 66% (31/47) and in our AST group 76% (42/55) of the patients required 3–6 months for recovery. Younger patients recovered sooner, and recovery was prolonged in the transposition and elderly groups.

As mentioned previously, it is important to understand the anatomy of the ulnar nerve around the elbow to ensure adequate decompression of the nerve during surgery. Release of the retinaculum of the cubital/Osborne's tunnel (Osborne's ligament) alone may not suffice. Nabhan *et al*[4] noted common areas of compression in addition to the medial epicondyle. In his series these were present in 38% (25/66) of cases. These areas of compression included the medial intermuscular septum in 30% (20/66), the ligament of Struthers in 6% (4/66) and the epitrochlearis muscle in 14% (9/66).

Conclusion

Simple decompression is an adequate procedure for decompression of the ulnar nerve in cubital tunnel syndrome. However, where the nerve is determined intraoperatively to be unstable or the bed unsuitable, anterior transposition of the nerve should also be performed. The two procedures have similar outcomes although simple decompression has some advantages *(Table VI)*. Nerve recovery is often prolonged, however, more so in the transposition and the elderly groups. The limitation of this study is that it is a retrospective review.

This article was not submitted to an ethical committee for approval. The content of this article is the sole work of the authors. No benefits of any form have been derived from any commercial party related directly or indirectly to the subject of this article.

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