

# Are “knife and fork” good enough for day case surgery of resistant tennis elbow?

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**Abstract** This observational retrospective study was performed on 22 consecutive patients treated surgically in a day surgery unit for resistant tennis elbow to ascertain the effectiveness of the “knife and fork” procedure. All patients had an unfavourable response to nonsurgical treatment lasting at least six months. A simple and inexpensive “knife and fork” technique yielded excellent results in 90.5% of patients and a high percentage (95.2%) of satisfied patients at an average follow-up of two years. There were no fair or poor results and no complications. We conclude that the “knife and fork” technique is a simple and dependable day case procedure. In the present National Health Service (NHS) era of tariff and “payment by results”, this approach is more cost effective than an arthroscopic alternative.

## Introduction

Tennis elbow is a common musculoskeletal condition [19] which affects 1–3% of the population in the age group of 40–60 years [7]. However, resistant tennis elbow is a rare, yet disabling, condition [17]. Repetitive movements of wrist extension predispose to the development of this condition whereby the dominant arm is more frequently (70%) involved [18]. Histopathology of the affected extensor carpi radialis brevis (ECRB) attachment demon-

strates noninflammatory angiofibroblastic tendinosis with neovascularisation, a disordered collagen scaffold, mucoid degeneration, and microtears [4, 11].

Although encouraging results have been recently obtained with the use of ultrasound shock wave therapy [16], up to 10% of patients may fail to respond to conservative management [22]. In these patients surgery can be offered and various operative techniques have been described which include open common extensor origin release [21], partial excision of extensor origin with repair [13], Z-lengthening of the extensor carpi radialis brevis [6], excision of the proximal part of the annular ligament [2], excision of the synovial fringe of the radiohumeral joint [12], bursectomy [10], percutaneous release of the common extensor origin [8], a combination of the aforementioned procedures [3], and an arthroscopic release [1]. However, surgical procedures have yielded varying results and outcomes [5, 14, 21, 24]. This study was designed to verify the effectiveness of the “knife and fork” technique as a day case procedure at our hospital for treatment of resistant tennis elbow.

## Patients and methods

This was an observational retrospective case series of 22 consecutive patients that underwent surgical treatment for resistant tennis elbow between September 2003 and January 2007 at our hospital. All patients were chosen for the operation following an unfavourable response to nonsurgical treatment of at least six-month duration with the following modalities: rest, cessation of exacerbating activities, nonsteroidal antiinflammatory medications, physiotherapy, and local steroid injections. The median local steroid injections given to the patients was three (range, one to six injections). The median duration of symptoms before

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**Table 1** Age and gender distribution

Age range (years)	Male	Female	Total
31–40	2	4	6
41–50	4	4	8
51–60	3	2	5
61–70	2	0	2
71–80	1	0	1
Total	12	10	22

the operation was 21 months (range, 12–36 months). None of the patients in this study had any other musculoskeletal comorbidities that would contribute to occurrence or affect results of the treatment, except one woman who had concomitant neck pain.

Of the 22 patients (Table 1), 21 were available for follow-up and their results were analysed. The one patient lost to follow-up had moved away with no forwarding address. Therefore there were 12 men and nine women with an average age of 49.3 years (range, 33–73 years). Median age of the men was 50 years and of the women 45 years. They were interviewed at an average 24 months (range, 9–48 months) after the operation, using the telephone questionnaire-based scoring system (Table 2) by Das and Maffuli [5]. This score was used as it has the advantage of succinctly presenting an individual's personal functional assessment of the current status and gives a realistic representation of the expectation of demands of an individual. The preoperative status was also comparable with the similar responses recorded in patients' medical notes and was verified at follow-up. Pain, grip strength, elbow function, and patient satisfaction as a result of the operation were scored according to the patient's telephonic response. Questions pertaining to the above variables were open-ended to avoid bias, and an overall score was achieved from the patient's response at the end of the interview. More than half (55%) of the first telephone calls resulted in no reply or found an answering machine. In these patients, two to three calls at different times of the day were made to obtain a response.

Pain was recorded and classified as none or minimal if the scores using the numerical scale were between 1 and 3, moderate if scores were 4–7, and severe if the scores ranged from 8 to 10. Grip strength was reported as normal, weak,

**Fig. 1** Length (4 cm) and site (elbow) of incision

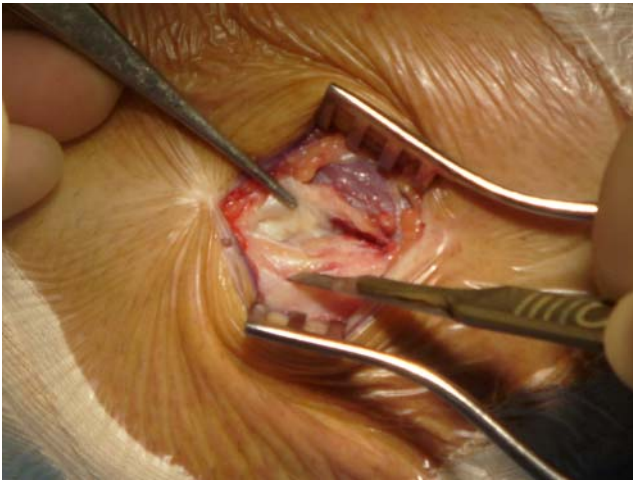
or very weak and compared with the preoperative status as documented in patients' medical records. Elbow stiffness was reported as mild, moderate, or severe. Patient satisfaction was recorded as satisfied, partly satisfied, or dissatisfied. Each elbow was given a numerical score for every category (Table 2). A grand total was obtained for each elbow and results were categorised as excellent if the score was 4 or less, good if the scores were 5 or 6, fair for scores of 7 and 8, and poor for scores between 9 and 12.

### Operative technique

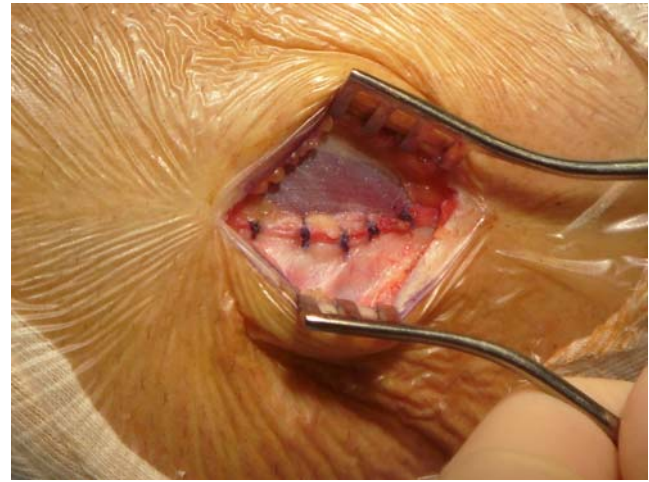
Under general anaesthesia and antibiotic cover the affected elbow was prepared with 10% povidone–iodine solution and draped in a supine position on an arm board. A tourniquet was then inflated and a 4 cm incision was made, centred over the lateral epicondyle (Fig. 1). Soft tissue dissection was performed using a scalpel down to the lateral epicondyle exposing the common extensor origin. The ECRB was identified by its tendinous origin next to the fleshy origin of the extensor carpi radialis longus. Approximately 1.5 cm of ECRB insertion was released and the degenerate part of the tendon excised (Fig. 2). The bony attachment at the epicondyle was crosshatched with an osteotome (Fig. 3) and then decorticated with a curette to expose raw bleeding bone. The ECRB insertion was then

**Table 2** Telephone questionnaire scoring system [5]

Score	Pain	Elbow function	Grip strength	Patient satisfaction
1	None or minimal	Without difficulty	Normal	Satisfied
2	Moderate	With difficulty	Weak	Partly satisfied
3	Severe	Severe difficulty	Very weak	Dissatisfied



**Fig. 2** Forceps holding up the erased and debrided extensor carpi radialis brevis (ECRB) tendon from the lateral epicondyle



**Fig. 4** Extensor carpi radialis brevis (ECRB) insertion reattached to its original insertion with 2'0' vicryl in interrupted sutures

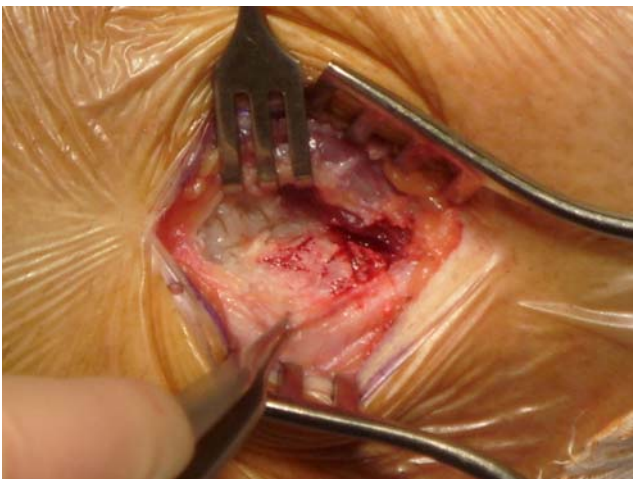
reattached to its original insertion with 2'0' vicryl in interrupted sutures (Fig. 4), thus preserving the length of muscle. The wound was closed in layers with a 3'0' subcuticular absorbable suture (Fig. 5).

Postoperatively the dressings were removed at 48 hours to allow gentle mobilisation. Full activity was allowed once the wound had healed.

## Results

The results were obtained by telephonic interviews from 21 patients and then analysed. One patient could not be contacted as he had moved away and was thus excluded from the study. Severe pain was the main reason to opt for

surgical treatment for 17 patients and moderate pain in four. Pain improved considerably postsurgery, 20 patients having complete pain relief. Only one patient with severe pain had residual moderate pain at final follow-up. Grip strength was weak or very weak in 19 of 21 patients (while two other patients had normal grip strength at presentation). Of these, 17 improved to achieve normal grip strength and two with very weak grip strength improved to weak grip strength at final follow-up. Severe or moderate elbow dysfunction reported by 14 and 7 patients, respectively, improved to normal in 19. Two with severe elbow dysfunction had moderate elbow dysfunction at final follow-up. There were ten manual workers in the study, eight of whom returned to their former occupation at an average of three months (range, two to six months) after the operation. A window



**Fig. 3** Bony attachment at the epicondyle cross-hatched with an osteotome to expose bleeding bone



**Fig. 5** Surgical incision closed with a 3'0' subcuticular absorbable suture

cleaner and a labourer had symptoms of elbow dysfunction after heavy exertion and had complete resolution of symptoms following short-term use of elbow clasps. Of the 11 nonmanual workers, all returned to levels of activities except for persistent upper limb pain in a woman with associated neck symptoms. According to the Das and Maffuli [5] scoring system there were 19 patients with excellent results and two with good results. On a satisfaction survey, 20 (95.3%) patients were satisfied with the outcome and there were no complications.

## Discussion

Our study describes a typical group of patients, in the fourth or fifth decades of life, with long-standing symptoms not responding to nonoperative modalities of treatment [9, 15, 21, 23].

The results of this study are encouraging, with 20 of 21 (95.2%) patients achieving an elbow that was completely free of pain at final follow-up. This pain-free status is an improvement over the 87.4% (76/87) reported by Das and Maffuli [5] and is similar to value of 95% reported by Thornton [20]. Grip strength showed a remarkable improvement with 19 of 21 (90.5%) patients regaining normal strength and no functional limitation. This once again exhibits considerable improvement over the 62% reported earlier [5]. Elbow dysfunction was present in all patients preoperatively and a marked progress was observed in 19 of 21 (95.2%) patients achieving normal elbow function. This result also shows improvement over the previously reported 84% [5]. Finally, patient satisfaction was uplifting with 19 excellent and two good results. Our results are similar to the 94% success rate reported by Yerger [24] and are better than the results of 56% excellent and 33% good reported by Veerhar [21] and the 75% combined excellent and good results of Das and Maffuli [5].

Our patient population closely resembles that of Das and Maffuli in terms of similar patient ages (median 47 years for men and 45 years for women versus 50 years for men and 45 for women in this study), same country (United Kingdom), similar primary care and referral from the general practitioners after initial nonoperative treatment, median duration of symptoms (median 20 months versus 21 months in this study), and the same average number (2.7) of local steroid injections administered in both the studies.

This technique was advantageous from an economic point of view as it was performed as a day case procedure. A scalpel was used instead of more expensive arthroscopic equipment and disposables. Therefore, hospital costs were less than a more technically difficult and time consuming arthroscopic procedure. Furthermore, tariff rate for the open

procedure is greater than the arthroscopic technique. However, we do agree that a detailed cost analysis is required and costs may vary depending on the health setup in different countries. We will endeavour to conduct such an analysis in the future.

Bias factor stands as a potential limitation of our retrospective observational case series. Therefore, the outcome results and the validity of conclusions probably have less strong evidence (level of evidence 4). We minimised the selection bias in our study by using a single surgeon consecutive case series of patients undergoing treatment between September 2003 and January 2007. Fortunately, all but one patient could be followed-up and this further helped reducing selection bias. The outcome data was collected prospectively by a single researcher, and not the operating surgeon, through a telephone questionnaire and was therefore fully recorded. This helped to minimise information bias and probably eliminated any inhibition the patient may have had while reporting an unfavourable outcome. We do realise that use of multiple scoring systems would further help eliminate bias against the single scoring system employed in this study. Encouraging results from this simple, cost effective and dependable procedure has allowed the unit to standardise the procedure and surgical outcome follow-up to continue a prospective data collection of patients undergoing surgery for resistant tennis elbow and use of multiple scoring systems.

In conclusion, a “knife and fork” technique is a simple and a dependable day case procedure. The results are reflected by the high percentage of excellent results (90.5%) and patient satisfaction (95.2%). In the present National Health Service (NHS) era of tariff and “payment by results”, this approach is more cost effective than an arthroscopic alternative.

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