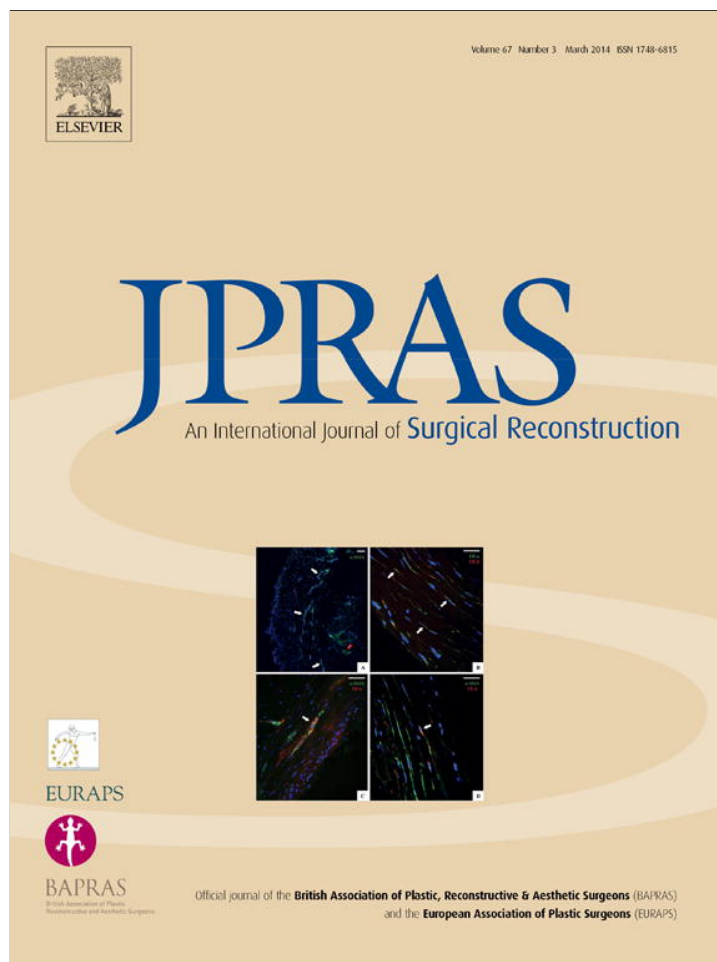


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A single-centre cost comparison analysis of collagenase injection versus surgical fasciectomy for Dupuytren's contracture of the hand

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Summary *Background and aim:* The options for treating patients with Dupuytren's contracture have broadened with the introduction of collagenase. Although the literature would suggest that collagenase treatment is effective, has few complications and is popular with patients, it has not been widely commissioned by the National Health Services of the United Kingdom and other European countries due to concerns about cost. The aim of this study was to compare the cost of surgical fasciectomy to collagenase injections for the treatment of Dupuytren's contracture in a single centre.

Method: Prospective data on 40 patients undergoing fasciectomy or collagenase injection (20 patients in each group) were collected between January and March 2013. Financial data on the costs of the procedures, equipment, theatre time and follow-up appointments were calculated.

Results: The average cost of an open partial fasciectomy pathway was £7115.34 and that of a collagenase pathway was £2110.62. Eight collagenase patients had physician-led follow-up appointments and only three had hand physiotherapy appointments. By contrast, every fasciectomy patient had at least one physician and one physiotherapist follow-up appointment routinely.

Conclusion: The results of this study demonstrate that collagenase treatment for Dupuytren's contracture of a single digit in selected patients is just over £5000 less than treatment for the same condition using surgical fasciectomy. Collagenase-treated patients require much less physician- and physiotherapist-led postoperative follow-up.

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Surgical fasciectomy has been the mainstay of the management of Dupuytren's contracture for many years. Increased knowledge about the disease and technical innovation has wrought only subtle changes in surgical practice. Fasciectomy and its variations require significant operating time and are demanding of surgeon, therapist and patient to achieve the optimum results. Fasciectomy has a recurrence rate of 30–40% and high complication rates.^{1–3} These problems together with increased engagement of the general public have led to an increased demand for non-invasive or minimalist treatment options, such as needle fasciectomy. The treatment options have broadened further with the recent introduction of collagenase injection. Collagenase injections have shown good initial results with high patient satisfaction and very low complication rates, although the recurrence rate remains unclear.^{4–9} The injections consist of the enzyme collagenase clostridium histolyticum and are generally well tolerated by patients with a low recurrence rate at 3 years.¹⁰

Collagenase injections can be performed on an outpatient basis with no operating theatre time needed. This alone suggests that collagenase injections may be a more cost-effective treatment of selected cases of Dupuytren's contracture compared to fasciectomy. Despite this, there has been a reluctance to introduce this form of treatment in the Health Service of the UK as well as a number of other European countries. However, this partly reflects uncertainty as the efficacy of this new treatment is largely due to concerns about cost, as collagenase is labelled as a high-cost drug and is not funded by payment-by-results care packages.¹¹ These concerns are driven by the price of the drug and the false perception that patients require three injections to achieve the desired correction. This latter point has been extrapolated from the original trial protocol, which limited treatment of an affected ray to three injections.¹² By contrast, in our experience, we have noticed the need for more than one injection is the exception rather than the rule.

The cost-effectiveness of collagenase has not been formally assessed. The aim of this study was to compare the costs of collagenase injections to that of fasciectomy for Dupuytren's contracture in a single centre.

Methods

In our hospital, a fasciectomy pathway patient will attend their first physician consultation following referral from their general practitioner. They will subsequently be booked for fasciectomy as a day case under regional or general anaesthesia. The procedure is generally performed 4–6 weeks following initial consultation. Every procedure is booked for 60 min of operating time and falls under the Operating Procedure Codes (OPCS) code T521. They will arrive the morning of surgery in the Day Surgery Unit (DSU), have their procedure, recover and go home from the Unit. The main expense associated with this pathway is the operating theatre time, anaesthetic time and staff costs. The patient is then discharged home the same day. They will all be followed up routinely by both the physician and hand physiotherapist at 2 weeks post operation.

The collagenase pathway patient will attend their first consultation following referral from the general

practitioner. At this appointment, the decision to treat is made. The injection is usually given at a further scheduled appointment in the outpatient clinic. The patient is then scheduled to attend the DSU the following day for the manipulation under local anaesthetic, which is administered by the surgeon, usually by inter-metacarpal block. The procedure is booked under the OPCS code T744. This procedure done is a six-bedded bay in the DSU without the need for any operating theatre time. Two to three patients are usually scheduled at 30-min intervals to be treated synchronously for optimum efficiency, taking into account the time required to achieve adequate anaesthesia. Treatment of even multiple patients only requires one surgeon and one nurse. The patient will go home the same day and does not have any routine follow-up appointments unless clinically indicated. Every patient is advised to call the hospital in case of any problems if necessary. The most common reason for a follow-up appointment being booked is a tear in the palmar skin that may need to be monitored.

Data for 20 consecutive patients undergoing collagenase injection and 20 consecutive patients undergoing fasciectomy were collected prospectively from January to May 2013. The patients were not matched. Monetary values for costs were obtained from the financial department at the hospital. Data collected consisted of costs for:

- first consultation (plus subsequent injection appointment for collagenase patients),
- cost of materials (collagenase),
- DSU and operating theatre costs,
- follow-up appointment costs and
- hand physiotherapy appointment costs.

Actual theatre time was taken from the electronic Operating Room Scheduling and Office System (ORSOS). The overall costs for each patient pathway, i.e., collagenase or fasciectomy, were totalled, and an average cost per pathway was calculated. All values are presented in Great British Pounds.

Results

There were 13 male patients in comparison to seven female patients in the fasciectomy group with an average age of 70 years (range 45–88 years). In the collagenase group, there were 16 male patients in comparison to four female, and the average age was 68 years (range 48–78 years). The involved digit is described in [Table 1](#).

Every patient attended the first consultation at a cost of £134 per appointment. Each collagenase patient then attended the second outpatient appointment to get the injection at a cost of £77. This results in a total of £211 for both initial consultations. The price of one vial of collagenase (Xiapex™) was £780. All single-digit fasciectomy procedures were listed for 60 min of operating theatre time. The cost of 1 h of operating theatre time was £780 (£13 per minute); however, this did not include staff and anaesthetic costs, which were added to the overall cost separately. The average length of operation was 76 min and the average cost of theatre time was £989.30 (range 481–£1859). The hospital is only remunerated for 60 min of

Table 1 Comparison of costs between single digit open partial fasciectomy and collagenase injection.

Collagenase							
Patient	Digit	1st & treatment consultation	Cost of drug	Day Surgery	Follow up	Physio-therapy	Total
1	RRF	£211.00	£780.00	£1083.00	£77.00 (1)	£38.82 (1)	£2189.82
2	RLF	£211.00	£780.00	£1083.00	£77.00 (1)	£38.82 (1)	£2189.82
3	RRF	£211.00	£780.00	£1083.00	£77.00 (1)	£38.82 (1)	£2189.82
4	LRF	£211.00	£780.00	£1083.00	£77.00 (1)	£0.00	£2151.00
5	RRF	£211.00	£780.00	£1083.00	£77.00 (1)	£0.00	£2151.00
6	LRF	£211.00	£780.00	£1083.00	£77.00 (1)	£0.00	£2151.00
7	LP	£211.00	£780.00	£1083.00	£77.00 (1)	£0.00	£2151.00
8	LLF	£211.00	£780.00	£1083.00	£77.00 (1)	£0.00	£2151.00
9	RRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
10	RRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
11	RIF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
12	RP	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
13	LRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
14	LRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
15	RLF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
16	RLF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
17	RRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
18	LLF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
19	LRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
20	LRF	£211.00	£780.00	£1083.00	£0.00	£0.00	£2074.00
						Average cost	£2110.62
Fasciectomy							
Patient	Digit	1st consultation	Day case cost	Theatre cost	Follow up	Physio-therapy	Total
1	RMF	£134.00	£5771.00	£481.00	£77.00 (1)	£194.10 (4)	£6657.10
2	LLF	£134.00	£5771.00	£949.00	£77.00 (1)	£194.10 (4)	£7125.10
3	RP	£134.00	£5771.00	£949.00	£308.00 (4)	£232.92 (6)	£7394.92
4	RIF	£134.00	£5771.00	£949.00	£154.00 (2)	£38.82 (1)	£7046.82
5	LP	£134.00	£5771.00	£1131.00	£154.00 (2)	£38.82 (1)	£7228.82
6	RRF	£134.00	£5771.00	£1859.00	£154.00(2)	£349.38 (9)	£8267.38
7	RRF	£134.00	£5771.00	£598.00	£77.00 (1)	£38.82 (1)	£6618.82
8	LP	£134.00	£5771.00	£1534.00	£77.00 (1)	£116.46 (3)	£7632.46
9	RMF	£134.00	£5771.00	£962.00	£77.00 (1)	£116.46 (3)	£7060.46
10	RLF	£134.00	£5771.00	£767.00	£77.00 (1)	£116.46 (3)	£6865.46
11	RLF	£134.00	£5771.00	£923.00	£77.00 (1)	£38.82 (1)	£6943.82
12	RP	£134.00	£5771.00	£767.00	£77.00 (1)	£116.46 (3)	£6865.46
13	RP	£134.00	£5771.00	£598.00	£77.00 (1)	£38.82 (1)	£6618.82
14	LP	£134.00	£5771.00	£858.00	£77.00 (1)	£232.92 (6)	£7072.92
15	LLF	£134.00	£5771.00	£858.00	£77.00 (1)	£155.28 (4)	£6995.28
16	LLF	£134.00	£5771.00	£702.00	£77.00 (1)	£271.74 (7)	£6955.74
17	LLF	£134.00	£5771.00	£923.00	£308.00 (4)	£155.28 (4)	£7291.28
18	LIF	£134.00	£5771.00	£884.00	£308.00 (4)	£310.56 (8)	£7407.56
19	RLF	£134.00	£5771.00	£780.00	£231.00 (3)	£116.46 (3)	£7032.46
20	RLF	£134.00	£5771.00	£1053.00	£231.00 (3)	£38.82 (1)	£7227.82
						Average cost	£7115.34

The actual number of follow up appointments with physician and physiotherapist is shown in brackets. Theatre cost is calculated as £13 per minute. (RIF – right index finger; RMF – right middle finger; RRF – right ring finger; RLF – right little finger; RP – right palm; "L" corresponds to the left hand digit.)

operating time. Anything over this is not reimbursed, which is on average £209.30.

Table 1 compares the costs between both populations. The average cost of a fasciectomy pathway was £7115.34 and that of a collagenase pathway was £2110.62.

Every fasciectomy pathway patient attended hand physiotherapy at a cost of £38.82 per appointment. The

average number of appointments patients had was four (range one to nine appointments) at an average cost of £152 (range £38.82–£342). By contrast, three patients on the collagenase pathway had physiotherapy appointments and only one appointment each.

Every fasciectomy pathway patient had at least one outpatient follow-up appointment at 2 weeks postoperatively

with a physician at a cost of £77 per appointment. The number of both physician follow-up and hand physiotherapy appointments each patient had is shown in brackets in Table 1. In the collagenase pathway, eight patients had one appointment each at £77 per appointment. The remaining patients were not followed up. All patients were given written instructions on whom to contact and where to attend at the hospital, should they have a problem when discharged; however, no patient required further review.

Within each group, there were no unplanned admissions or returns to theatre. The eight collagenase pathway patients were followed up to review small skin tears in their palmar skin that occurred during the release of their contracture. All of these wounds healed with conservative management. The fasciectomy patients were followed up to review wound healing. The majority of patients were fully healed by 6 weeks after surgery. The eight surgical patients who had more than one follow-up appointment had delayed wound healing, which all healed with conservative management.

Discussion

The National Health Service is under pressure to make significant savings that are vital for its survival. The results of this study demonstrate that collagenase treatment for Dupuytren's contracture of a single digit in selected patients is just over £5000 less than treatment for the same condition using surgical fasciectomy.

In a cost–benefit comparison between open partial fasciectomy, needle aponeurotomy and collagenase injection, Chen et al. concluded that fasciectomy is not cost effective but that needle aponeurotomy and collagenase injection are cost effective, provided the cost of the collagenase injection is priced below \$945.⁷ At the time of writing, the exchange rate for the US Dollar to the Great British Pound was 1.52. The cost of Xiapex™ collagenase is £780, which equals \$1185. It is difficult to compare the results of this study with Chen et al. due to the currency differences and inflation, but the costs of the two treatments appear similar.

Two business case models that compare the costs of collagenase versus open fasciectomy have been published. The first, published by the North East Treatment Advisory Group gives the average cost of two injections plus four outpatient appointments as £1944 versus a figure of £2592 for a fasciectomy patient making a minimum saving of £648.¹³ The Group acknowledge that the price for a fasciectomy is very conservative as they have not included theatre and staff costs, which are between £3000 and £5000. The second, published by the Mid Mersey Medicines Management Board cost collagenase at £2112 versus £5269 for fasciectomy.¹⁴ Neither of these groups have included hand physiotherapy costs in their estimates. The Mid Mersey costings have included theatre costs and physician follow-up, which is why it is more consistent with our findings. Our study is unique in that we have attempted to cost the whole patient pathway and have analysed the frequency of follow-up appointments, which is why our figure of £7115.34 for fasciectomy may seem unusually high. Despite this, our study and the above reports further support the potential cost effectiveness of collagenase injections over fasciectomy.

Our study does not take into account the cost of recurrence rates and complications. The literature, however, indicates clearly that significant complications are very rare after collagenase injection. Current albeit short-term information suggests that recurrence rates are comparable to fasciectomy.^{5,10,15} None of the patients in this study required more than one injection to achieve the desired correction, possibly reflecting the selection criteria used by the senior author. This further supports the notion that one injection is sufficient to achieve a satisfactory correction. Other studies have shown that 1.4 injections were needed on an average.¹⁶ Our study clearly demonstrates that the collagenase pathway patients required far fewer follow-up appointments with both the physiotherapist and physician than the fasciectomy pathway patients. This represents a significant saving, but long-term success rate of collagenase injections is yet to be evaluated in this hospital department.

With the recent restructuring of the National Health Service (NHS), Clinical Commissioning Groups (CCG) are faced with making decisions on how best to spend their money for their patients. CCG will be looking for value for money. The results from this study support the commissioning of collagenase injections for the treatment of selected cases of Dupuytren's contracture.

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