Cost minimisation using clinic-based treatment for common hand conditions – a prospective economic analysis

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ABSTRACT

INTRODUCTION The purpose of this study was to compare the cost of treatment of Dupuytren's disease, ganglia and trigger digits in the out-patient department with the operating theatre.

PATIENTS AND METHODS All patients seen in a new patient hand clinic with a diagnosis of Dupuytren's disease, trigger digit or ganglion of the wrist or hand requiring treatment were prospectively identified over a 6-month period. The numbers undergoing a procedure in the out-patient clinic or theatre were recorded. Costings of theatre time and out-patient time, as well as national tariff income, were obtained from the hospital management.

RESULTS Over the 6-month period, 80, 26, and 52 patients were treated with regard to Dupuytren's disease, ganglia and trigger digits, respectively. Of these, 37, 23, and 44 were treated by an out-patient procedure, and 43, 3 and 8 underwent a formal operation. The total cost of the out-patient procedures was calculated at £1560 over 6 months. To perform these as formal operations would have cost £64,896. The cost savings were, therefore, £63,336, or £126,672 per annum.

CONCLUSIONS Out-patient interventions for Dupuytren's disease, ganglia and trigger digits result in significant cost savings over formal surgical treatment.

KEYWORDS

Out-patient department – Operating theatre – Hand procedures – Cost analysis

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Common pathologies seen in the hand clinic include Dupuytren's disease, ganglia and trigger digits. The most common method of treatment of these is formal operation in the operating theatre. However, effective percutaneous out-patient based treatment has been described for all three of these conditions. A previous retrospective review identified potential cost savings.¹

Dupuytren's disease forms a large part of the workload of most hand services. Treatment options described range from fasciotomy to limited fasciectomy to total dermo-fasciectomy. The last three decades have seen a resurgence of percutaneous fasciectomy, particularly in Europe.^{2–6} Percutaneous fasciotomy has several potential advantages. The procedure has had lower, less serious, complication rates. Most patients have a rapid recovery, and can use their hands optimally within a few days. Furthermore, the procedure can be carried out on an out-patient setting, under local anaesthetic. This results in a much shorter hospital stay for patients. The clinical outcomes of percutaneous needle fasciotomy compared with

limited fasciectomy have been reported.⁶ It has been demonstrated that, especially in the case of mild contractures, percutaneous needle fasciotomy has a similar short-term outcome, with much lower complication rates and higher initial short-term satisfaction among patients. The UK national Institute for Health and Clinical Excellence (NICE) recommends needle fasciotomy as a treatment for Dupuytren's contracture,⁷ suggesting that those with less severe disease, or with contractures mainly affecting the MCPJ would benefit most. Very few complications have been reported when treatment is limited to the palm.^{8,9}

Stenosing tenosynovitis, or trigger finger/thumb, is another common condition seen in the hand clinic. The treatment options have been previously well described.¹¹ Many patients respond well to injection, with 60–92% long-term relief of symptoms reported.¹⁰ However, given the high prevalence of this condition, a large number of patients still require release of their trigger digits. Lorthioir¹² first described percutaneous A1 pulley release in 1958. This technique has gained popularity recently due to its relative

ease to perform, patient satisfaction, and the fact it can be done quickly and simply in the out-patient setting. Papers have reported up to 100% success rates using this method, with no reported complications.^{15–15}

The third condition under investigation in this paper is the wrist ganglion. Surgical excision has previously been thought of as the gold standard for cure. Success rates, however, vary from 66% to 99%.¹⁶ In addition to this recurrence rate, surgery is not without other complications, including infection, wound healing, neuromas, joint stiffness, and decreased grip strength.¹⁷ The percutaneous aspiration of ganglia and injection of corticosteroids was first reported by Becker in 1953. Since then, a variety of compounds have been injected, including steroid and hyaluronidase. Injection of scerosant has also recently been demonstrated by Ajekigbe and Stothard¹⁸ to be safe and effective, with a 10% recurrence rate. Recurrence rates after aspiration have varied from 13% to 100%, compared with 1–34% after surgical excision.¹⁶ The rate of other complications is much lower than that of formal surgery. Aspiration also has the benefit of demonstrating the benign nature of the ganglion to the patient, so that if recurrence does occur they may be more willing to live with it.

Dupuytren's disease, trigger digits and ganglia can all be treated in the out-patient clinic, with similar outcomes to formal surgical treatment in the operating theatre. These are all common conditions, and the potential cost savings of out-patient treatment are large. Bittner *et al.*¹⁹ conducted a study comparing office-based aspiration of flexor sheath ganglia with formal release in the US, which has a different healthcare system. They demonstrated significant cost savings. There is no published literature on prospective cost-analysis of any out-patient hand procedures in the UK.

The aim of this study was to conduct a cost-minimisation analysis specifically comparing out-patient versus operating theatre based treatment of Dupuytren's disease, trigger digit release and ganglion aspiration. In addition, we have calculated the income generated to our centre from performing these operations based on current national tariff rates.

Patients and Methods

All patients attending a new patient hand clinic and diagnosed with Dupuytren's disease, trigger digits or ganglia requiring treatment were identified.

Dupuytren's disease

For Dupuytren's disease, those with contractures affecting mainly the MCPJ and with palmar cords identifiable proximal to the distal palmar crease were deemed suitable for percutaneous release. All other types of contracture were listed for limited fasciectomy in theatre. A standard tech-

nique was used for percutaneous fasciotomy, based on previously published work.²⁰ After obtaining verbal informed consent, and the patient washing their hands, the palm was cleaned with chlorhexidine 5% solution. 1–2 ml of plain 1% lignocaine was infiltrated subcutaneously into the affected area. This was then left for 5 min to gain maximum effect. An 18-gauge needle was then inserted subcutaneously to first free the overlying skin from the cord of Dupuytren's tissue. The bevel of the needle was then carefully passed backwards and forwards through the cord, working from superficial to deep. After this, the finger was straightened by the clinician, and the procedure repeated if any of the band remained. Once a satisfactory correction was achieved, a paraffin gauze dressing was applied, the patient shown simple stretching exercises, and given a follow-up appointment for 1 week. Upon return, if there was not a satisfactory correction, percutaneous release was repeated. If this failed, then the patient was listed for open fasciectomy.

Ganglion of the hand or wrist

The standard protocol for all patients with a ganglion of the hand or wrist was percutaneous aspiration and injection with sclerosant, based on previously published work.¹⁸ After taking informed verbal consent, 2 ml of 1% lignocaine was infiltrated subcutaneously over the ganglion. An 18-gauge needle was then passed into the ganglion, aspirating the contents, demonstrating to the patient the typical gelatinous, benign consistency. After removal of the syringe, but leaving the needle in place, sclerosant (sodium tetradecyl sulphate) was injected through the same needle, aspirating back before injection, to confirm the needle was not in a vessel. A pressure dressing was then applied with instructions to leave on for 48 h. The patient returned after 2 weeks. Any recurrence was treated by re-aspiration and injection twice more. If the ganglion still persisted, the patient was offered the option of surgery.

Trigger digits

All adult patients presenting with trigger digits resistant to corticosteroid injection were offered percutaneous release. This was carried out in a manner identical to the procedure previously described by the senior author.²⁰ Using aseptic technique, 3–4 ml of plain 2% lignocaine was injected subcutaneously in and around the A1 pulley. After the area had become insensate, the area was sterilised and an 18-gauge hypodermic needle inserted into the flexor tendon and the patient asked to move their finger actively to confirm correct needle placement. The needle was withdrawn slightly to 'feel' the sheath, which is scratched through longitudinally. The patient was asked to flex and extend fully the finger to confirm abolition of triggering. Children, and adults who failed to respond to two attempts at percutaneous release were offered surgical release.

Table 1 Patients seen and treated over the 6-month study period

Condition	Total number seen	Number treated as out-patient (%)	Number treated in theatre (%)
Dupuytren's disease	80	37 (46)	43 (54)
Trigger digit	52	44 (85)	8 (15)
Ganglia	26	23 (88)	3 (12)
All	158	104 (66)	54 (34)

All complications were recorded over the 6-month period.

Cost analysis

Costings of theatre time, out-patient time and national tariff payments for 2006–2007 were obtained from the hospital orthopaedic and trauma management. These were then used to generate costings for each procedure, whether in out-patients or theatre. The costs could then be set against national tariff income to calculate net income for each procedure to the hospital. All costings obtained were for the running costs of each session, whether in theatre or out-patient clinic. This included basic consumables, nursing and anaesthetic staffing where necessary, but excluded medical personnel costs. Medical personnel costs were not included as these were considered relatively fixed costs, as the trust was funding the medical staff cost whatever treatment the patients underwent.

Results

The breakdown of patients seen and treated over the study period is shown in Table 1.

All of the Dupuytren's patients in the study gained satisfactory correction after the first percutaneous release. All those undergoing formal fasciectomy were deemed unsuitable for percutaneous release according to the previously described criteria.

Of the eight patients treated by formal operation for trigger digit, four were children too young to co-operate with a clinic procedure, two had concurrent carpal tunnel release, and two were trigger digits refractory to previous percutaneous release.

The three patients undergoing surgical excision of ganglia were all for cases refractory to aspiration, attempted before the study period.

There were no complications associated with any of the procedures during the 6-month period, whether performed in the out-patient clinic or theatre. There were no episodes of recurrence during the study period of any of the conditions treated.

Out-patient costs were calculated to be £185 per 3-h session. Theatre costs were calculated at £1872 per 3-h session. These figures included all basic consumables and staffing, including anaesthetic staff in theatre, but excluded the cost of surgical personnel. Timing for an out-patient procedure was an average of 15 min, allowing 12 cases per session to be achieved. Allowing for theatre turnaround, an average of 3 cases per theatre session were achieved in this hospital during the study period.

Based on these session costings and timings, the cost of the out-patient procedures was calculated at £1560 ($104 \times £15$) over 6 months, or £3120 per annum. To perform all the clinic procedures as formal operations would have cost £64,896 ($104 \times £624$) over 6 months, or £129,792 per annum.

Table 2 National tariff income and theatre/out-patient costings and net income for the treatment of Dupuytren's disease, ganglia and trigger digits in the study centre

	Dupuytren's disease	Trigger digit	Ganglia
National tariff income (£)	1714	1322	
Cost in theatre (£)	624 ^a	624 ^a	624 ^a
Cost in out-patients (£)	15 ^b	15 ^b	15 ^b
Net income if performed in theatre (£)	1090	698	437
Net income if performed in out-patients (£)	1699	1307	1046

^a£1872/3; ^b£185/12.

The cost savings were, therefore, £126,672 (£129,792 – £3120) per annum. As discussed above, this did not include medical staff costs; however, in situations where staff are paid by different sources depending whether out-patient or theatre procedures are performed, this must be taken into account.

The national tariff income to the trust in 2006 for each procedure performed is shown in Table 2. This includes the local uplift factor. Table 2 also demonstrates the net income for each procedure if performed in out-patients or theatre.

Discussion

Few papers in surgery, and in particular hand surgery, investigate the economics associated with healthcare provision. A review by Myers *et al.*²¹ in 2006 found only four cost-related papers, three of which investigated open versus endoscopic carpal tunnel release. Chung *et al.*²² examined 1188 hand surgery outcome studies published in the *Journal of Hand Surgery* (American and British editions) from 1988 to 2004 and found only five dealing with cost analysis. For audit papers, only 2% had an economic analysis. Any healthcare system has only a finite level of funding, with a resultant demand for cost containment. There is an increasing demand for economic analysis, particularly cost minimisation analysis. Clinicians are becoming increasingly responsible for providing not only efficacious treatment, but also cost-effective treatment for their patients, in order to maximise scarce resources.

In the UK, the NHS is undergoing fundamental change. A national tariff system is being introduced for the reimbursement of hospital services on a fee-per-item basis.²³ Hospitals will have few other sources of income, and face greater financial accountability than ever in order to provide a maximally cost-effective treatment for every fee received through the national tariff. This new financial regimen will only further highlight the need to demonstrate effective cost analysis of interventions.

Multiple treatment strategies for the management of the common hand conditions seen in this paper have been advocated. In an era of increasing cost accountability, as well as increasing operative costs, clinicians have an increasing responsibility to support the least costly alternative, if the outcomes of competing strategies are the same. It has been stated elsewhere that more research on economic analysis needs to be conducted in hand surgery.²² A study such as this demonstrates the potential cost savings available from using already validated treatments.

In this paper, we have demonstrated a saving to one trust of £126,672 per annum for the selective out-patient treatment of patients with Dupuytren's disease, trigger digits and ganglia. Clearly, not all patients are suitable for out-patient treatment, but we were able to treat 66% of the cases by out-patient procedures alone during the study period.

Percutaneous treatment of selected cases of Dupuytren's disease, ganglia and trigger digits has been previously demonstrated to be effective, and it is not the aim of this paper to corroborate these findings. Our low complication and recurrence rates do, however, concur with previously published studies. It must be noted that although these procedures are performed as out-patient procedures, they still require adequate training and skills in order for them to be carried out safely and effectively. We have had general practitioners with special interests sit in with us in our clinics and all have agreed with us that these procedures are for people undertaking them regularly and not for the 'occasional operator'. Furthermore, transferring this work to an out-of-hospital setting would result in a significant loss of income to hospital trusts. As medical care moves towards practice-based commissioning and community provision, if these simple procedures are performed outwith a hospital setting and budget, it may well actually remove a source of potential 'profit' from a hospital trust. The structure of the current national tariff system appears to reward financially the more simple, straightforward cases as opposed to more complex work.

Aside from the cost implications, and the freeing up of limited operating theatre time, patients anecdotally prefer out-patient procedures. They are quick and avoid hospital admission, as well as avoiding a general anaesthetic and potential associated morbidity. There were no recurrences of the conditions treated during the study period. Even if there were, and after two percutaneous attempts the procedure was then carried out in theatre, the overall cost of treating that patient would only be £30 (2 × £15) more than immediate theatre treatment. This is more than offset by the overall out-patient cost settings.

Conclusions

Out-patient based treatment of selected cases of Dupuytren's disease, trigger digits and ganglia is both cost effective and successful. It results in significant cost savings when compared to formal surgical treatment. We would, however, counsel that these procedures still need to be performed in specialist hands in order to maintain a satisfactory outcome and low complication rates.

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