PERCUTANEOUS NEEDLE APONEUROTOMY: COMPLICATIONS AND RESULTS

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Recently French rheumatologists have repopularized fasciotomy using a percutaneous needle technique. This blind approach has been claimed to be plagued by numerous complications. We reviewed the charts of 211 patients treated consecutively on 261 hands and 311 fingers to assess the rate of postoperative complications. The first 100 patients were evaluated with a mean follow up of 3.2 years to assess the rate of recurrences and extension of the disease. In the whole group the mean age was 65 years and delay between onset and treatment was 6 years. Division of the cords were performed only in the palm in 165 cases, in the palm and finger in 111 and purely in the finger in 35. Complications were scarce without infection or tendon injury but one digital nerve was found injured during a second procedure. Postoperative gain was prominent at metacarpophalangeal joint level (79% versus 65% at interphalangeal level). The reoperation rate was 24%. In the group assessed at 3.2 years follow up, the recurrence rate was 58% and disease “activity” 69%. Fifty nine hands need further surgery. The ideal indication for this simple and reliable technique is an elderly patient with a bowing cord and predominant MP contracture.

Chirurgie de la main 2001; 20: 206–211 © 2001 Editions scientifiques et medicales Elsevier SAS.

INTRODUCTION

Dupuytren's contracture is a controversial topic and has been the subject of many debates since it was first described. After the British attacks to take the discovery away from our Empire baron, it seems, now, that Félix Plater of Basle described the condition 150 years before Cline, Cooper or Dupuytren. Its aetiology is still mysterious, which explains the variety of proposed treatments.

Historically surgical treatment started with the percutaneous aponeurotomy which was recommended by Sir Cooper and the Baron himself, but this was later replaced by aponeurectomy. The frequency of recurrences led to more extensive excisions during the short-lived fashion for the “radical” aponeurectomies, before a return to more limited aponeurectomies due to an increase in complications combined with only a small decrease in recurrences. Two major thresholds have been crossed, firstly in the decreased rate of recurrences due to skin graft, and secondly, due to the “open palm” technique, there has been a decrease in complications such as pain, haematoma and skin flap necrosis. The rise of non-invasive techniques also touched Dupuytren's contracture and rheumatologists, with the support of the media, have repopularized the Baron Dupuytren's aponeurotomy, using a percutaneous needle technique (AA). Since 1992, we have used this technique in a group of selected patients. We have treated 261 hands and 311 fingers in 211 patients with this technique, of which one hundred hands have been checked after a mean time of 3.2 years. We thought it interesting to assess the situation regarding the immediate complications and the efficiency of the technique in the middle term on the development of the condition.

PATIENTS AND METHODS

Within the prospective series of 211 patients, the mean age was 65 years (range, 31–91 years), and 82% were men. Among the 261 hands treated, 39 had been treated bilaterally in the same patient and 11 were a revision on one side following recurrence. The right hand was treated in 142 cases, and the left in 119 cases. The ring finger (55%) was the most commonly treated (Table 1). Thirty-four patients had a history of trauma, and 21 of

Table 1—Localization of hand

<table>
<thead>
<tr>
<th>Finger</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb</td>
<td>2</td>
</tr>
<tr>
<td>Index</td>
<td>0</td>
</tr>
<tr>
<td>Middle finger</td>
<td>36</td>
</tr>
<tr>
<td>Ring finger</td>
<td>172</td>
</tr>
<tr>
<td>Little finger</td>
<td>101</td>
</tr>
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</table>
cutaneous herniation, the section was done along a
patient on the day after the AA, unless there had been a
whilst unrestrictive hand movement was recommended
digital levels. In most cases a crack was heard and the
several levels, on average two palmar levels and two
recurrence.
always explained to the patients, as was the risk of
when the persisting cords could not be divided without
progressively towards multiple sections of the cords at
orientation of its bevel which was used as a scalpel. At
efficient angle (and reduce the risk of damage to the
edge, so it was possible to tackle the cord under the most
continued proximally, in order to avoid disappearance
of the digital cord, which is most difficult to treat
following the AA in the palm. An aid was used to hold
the finger extended, so that the cord was tight and
prominent. This aid was a block specifically designed to
lift the hand, and leave the fingers hanging over the
diagonal (and reduce the risk of damage to the
pedicles). A gauge 19 needle was introduced, noting the
orientation of its bevel which was used as a scalpel. At
the finger level, because of proximity of the pedicle,
repeated piercing of the cord was done to weaken it,
whereas a straightforward section was always possible at
the palmar level. At the level of the palmar distal crease,
transverse fibras hold the pedicles down. In the case of
cutaneous herniation, the section was done along a
proximal tangent to allow the release. We moved
progressively towards multiple sections of the cords at
several levels, on average two palmar levels and two
digital levels. In most cases a crack was heard and the
AA was stopped when the finger totally extended or
when the persisting cords could not be divided without
risk. The possibility of an incomplete correction was always explained to the patients, as was the risk of
recurrence.
An extension orthosis was then fitted for the nights,
whilst unrestrictive hand movement was recommended
during the day. The dressing was taken off by the
patient on the day after the AA, unless there had been a
skin incision, in which case the dressing was replaced,
and the hand was cleaned by the patient at home. At the
end of the first month, in the event of sensitivity of the
palm at the level of a persisting nodule, treatment with
local injection of corticoids (Ketchum treatment) was
offered.
In our series, we performed 165 palmar sections, 111
palmo-digital sections and 35 digital-only sections.
Commissure were released in 19 cases, and herniations
in 27 cases. The mean duration of the surgical treatment
was 8 min. Cases when AA was used to prepare for a
later aponeurectomy have not been included, but those
in which an AA was attempted under an axillary block
even though aponeurectomy had been originally
planned (five cases) have been included. A file was filled
in for each patient and the complications were recorded
each follow-up, as well as the improvement compared
to the preoperative figures.
Of the 111 treated hands, 100 were reviewed after a
mean follow-up of 3.2 years in order to evaluate the
recurrence rate. Of the ten patients (11 hands) that were
not reviewed, eight were contacted by the phone (no
functional handicap) and two had moved (one bilateral).
For the analysis of the results, a method that took
into account that a great number of cases were treated in
the early stages (thus with limited potential for angular
gain) had to be chosen. We decided to consider the gross
angular gain and the percentage improvement compared
to the initial deficiency. A paired t-test was used for the
statistical study.

RESULTS
In the complete series of 311 fingers, there were no
infections or tendon injuries. Paresthesia (four cases)
and Tinel's sign (two cases) resolved quickly, suggesting
neuropaxia, except in one case. These signs are likely to
be related to stretching of the pedicle during the peri-
operative extension exercises. In four of the cases, the
condition was infiltrating (stages III and IV in which the
tissue was probably "trapped" inside the pathological
tissue), and in two cases there was a known polyneuritis.
Nevertheless, in the case of the persisting paresthesia
(without Tinel's sign), a serious recurrence within 2
years led to another operation, during which a digital
neuroma was found. No repair was carried out, as there
was no functional handicap.
The other minor complications are listed in Table 3.
Of the 39 nodules which were still sensitive at the end of
the first month and treated by steroid injection, 36
showed immediate improvement.
The pre- and postoperative results for the MP, the
PIP, the cumulative deficit (MP + PIP + DIP) and the
gain in percentage terms are shown in Table 4. The
mean total gain was 76%, and the mean MP gain (79%)
was significantly higher than the mean PIP gain (65%) (P > 0.05).

"Recurrences" are difficult to define with this method of treatment because of the persistence of pathological tissue. During the follow-up period, 59 hands (one bilateral case) needed further surgical intervention (17 underwent further AA and 42 underwent aponeurotomy). If we take into account the four hands awaiting intervention, the revision surgery rate is 24%.

Given that the follow-up period was short for some patients; a group of 100 hands were reviewed after 3.2 years (Table 5). In this group, there was a recurrence in 58 of the cases treated, and extension of the disease was noted in 11 hands, i.e., a global "activity" rate of the illness of 69%. Nineteen hands needed a second operation.

**DISCUSSION**

With the support of the media, aponeurotomy has been repopularized by French rheumatologists (Badois et al., 1993, 1997; Lermusiaux and Debeyre, 1979). It has been claimed that this blind method is associated with a high number of complications. Caroline Leclercq reported the views of 107 hand society (GEM) surgeons who responded to a survey. Fifty-six had seen one or more complication: 66 ruptures of flexor tendons, 50 nerve lesions (33 permanent), nine arterial injuries, ten cases of sepsis and ten cases of algodystrophy.

We observed only one permanent nerve injury and we believe that most injuries can be avoided by good anatomical knowledge and the use of precise indications and rigorous technique.

We have slightly modified the Lariboisière technique which we thought was cautious on account of the size of the needle (16 5/10) used to inject the steroid, and because of the number of sessions (49 for one of our patients with a persisting stage IV following 2 years of treatment). We chose a needle bevel that allows cord section in a single session without a steroid injection. In contrast, the Debeyre technique has some bold features, and it is claimed that it can be used for any type of cord, including the spiral ones so feared by surgeons even when operating under direct vision. It is usually possible to predict spiralling of the pedicle around the cord of the Dupuytren's contracture, the anatomy of which was described by Gosset (1967), and the principle was described by Short and Watson (1982) in a short article that passed almost unnoticed. When the skin adheres to the cord, there is no risk of crossing. When the skin moves relative to the cord there is the possibility of a spiral, but it may also be due to a fat lobule, and false positives are numerous, as our surgical experience has taught us. This sign needs to be looked for between the distal palmar crease and the proximal digital crease. If it is found, any section must be avoided at this level. A more proximal section in the palm crease is always safe. We use the same sign at the finger level. This means that the cords that adhere to the skin are the most accessible, but it must be said that they are the ones in which AA operations lead most easily to skin tears. This complication is minor and can be foreseen by the surgeon: it must be explained to the patient before the treatment. Great care and a solid surgical experience are needed at the level of the fingers. Only midline and prevascular cords, which are extended under the skin are accessible without risk. We are of the opinion that postoperative bracing is needed, since in the resting position, the hand is in semi-flexion, thus helping the "re-formation" of the cord.

Comparison of our results with data from the literature will be brief as there are few relevant references. In a multicentre study organized by rheumatologists (Badois et al., 1993), 952 hands in 799 patients were treated over 1557 sessions (3736 aponeurotomies). An improvement of more than 70% was achieved in 92.6% of the stage I cases (49%), in 77.7% of the stage II cases (90%), in 71.2% of the stage III cases (135°) and in 56.6% of the stage IV cases (> 135°). The complications recorded were: two ruptures of flexor tendons, two nerve

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**Table 3—Peroperative and postoperative complications**

- One peroperative immediate failure followed by an immediate aponeurotomy
- One immediate failure on an 88-year-old patient (improvement of 50° on a stage IV)
- Two Tinel's signs and three cases of hemidigital paresthesiae; these all disappeared within 2.5 months on average
- One digital neurina found at a second operation
- One case of bleeding which necessitated a change of dressing before leaving the unit (patient taking anticoagulants)
- 11 cases of post operative pain (analgesics prescribed for 3 days)
- 1 case of isolated oedema (prior irradiated breast cancer)
- 1 suspicion of algodystrophy (limited flexion with pain) healed without any sequelae
- 39 nodules "sensitive" to pressure after one month (treated by injection of corticoids)

**Table 4—Short-term results after aponeurotomy**

<table>
<thead>
<tr>
<th></th>
<th>Preop</th>
<th>Postop</th>
<th>Improvement (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>65°</td>
<td>15°</td>
<td>76%</td>
</tr>
<tr>
<td>MP</td>
<td>48°</td>
<td>10°</td>
<td>79%</td>
</tr>
<tr>
<td>PIP</td>
<td>37°</td>
<td>13°</td>
<td>65%</td>
</tr>
</tbody>
</table>

**Table 5—Results after a mean follow-up of 3.2 year**

<table>
<thead>
<tr>
<th>Number (with recurrence)</th>
<th>Preop</th>
<th>Immediate postop</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MP (N=100)</td>
<td>52 4</td>
<td>14 4</td>
<td>16 4</td>
</tr>
<tr>
<td>MP (N=100)</td>
<td>38 4</td>
<td>8 4</td>
<td>10 4</td>
</tr>
<tr>
<td>PIP (N=25)</td>
<td>26 4</td>
<td>11 4</td>
<td>17 4</td>
</tr>
</tbody>
</table>
sections, skin cracks in 2% of cases, temporary
dysaesthesia in 0.8% and "more rarely" algodystrophy,
pain, infections, vagal discomfort, benign haematomas,
etc. Higher figures were found in the Lariboisière study
carried out on 138 cases in 1993: 16% skin cracks, 2% nerve
lesions, 2% infections. Bleton (1997) did not find
any cases, whilst Schernberg (1994) found one case per
100. Finally, the immediate failures are recorded
differently, depending on whether the patient was
selected. Badois and Bleton recorded a failure rate of
19%, and Schernberg a rate of 15%. Bleton, who
reviewed 59 fingers with a 73° preoperative deficit, noted
after 6 months that 85% of the patients did not have an
MP joint deficit, but 51% still had a PIP deficit.

There is also a tendency to establish a parallel
between AA and the transcutaneous aponeurotomy
with a scalpel. Rodrigo et al. (1976) noted complications
in 2% of cases, but Colville (1983), a master of the
method, did not notice any. He studied 95 patients (137
fingers), with a follow-up period of more than 2 years.
His indications remained selective: only slowly progress-
ing cases with prominent cords which were covered
with plenty of fat in subjects over 50 years of age were
treated. The preoperative deficit was of 102° and the
average gain was of 57°. Duthie and Chesney (1997)
with a less carefully selected group of 82 patients
followed over 10 years, noted a gain of 49° from the
mean preoperative deficit of 71°. Thirty-four percent of
the patients did not have any other treatment during the
follow-up period, whereas 66% underwent an aponeu-
romy. In his series of 78 hands, Rowley carried out
only palmar aponeurotomies, with a gain of 30° at the
level of MP but without a PIP gain at 15 months
(Rowley et al., 1984). Finally Bryan, in a series of 23
patients, reviewed with a follow-up of 5.3 years, also
noted good conservation of the MP gain in 57% of
cases. In four of the seven revision operations that were
required, the MP joint was still corrected (Bryan and
Ghorbal, 1988).

It would not make sense to compare the results of AA
to those of aponeurectomy because for more early cases
are treated with AA and, at least in our series, young
patients were not treated, especially those with skin
involvement, for whom we preferred a skin graft. How-
ever, if we compare our AA series to a series of
open palm aponeurotomies which we have published
(Foucher et al., 1992), which included 107 patients (140
fingers) who were re-examined after more than 5 years,
their average healing time was 26 days, with an average
sick leave of 28 days. There was a low rate of
complications; one case of bleeding which required a
new dressing (3.5% of patients were taking anti-
coagulants), but no haematoma and no skin necrosis.
Postoperative pain occurred in 20% of cases (only 10% of
the patients actually took the prescribed analgesic),
and temporary dysaesthesia was present in 4.6% of cases
(persisting in 3.1%) and algodystrophy (diagnosed on
three phase scintigraphy) in 7% (of which 2.8% had a
functional deficit). After 5.6 years, the recurrence rate
was 40.6%, of which 23% were severe enough to require
repeat surgery. Extension was noted in 39% of all cases
resulting in total activity rate for the disease of 55%.
In fact this rate varies in direct proportion to the follow-up
period, which explains the high rate of Tubiana (66%),
who had a follow-up period of more than 10 years. Thus,
the comparison is globally unfavourable for AA, for
which the recurrence rate within a short period is 58%.
Far from taking the place of the surgical options, AA
has found its place next to aponeurectomies. Providing
the cord is easily accessible, elderly patients (even if the
expected correction crnplete), those with mild
disease (especially with only a metacarpophalangeal
deficit), those who need a stick or a palmar support to
walk and patients who have associated pathologies
(arthrosis, anticoagulant treatment, short life expect-
cy, etc.) can benefit from this technique. One of the
best indications is palmar disease in people aged over 50
years. Often, patients with a positive "table top test"
(Hueston, 1977), but only a moderate deficit are
temporarily refused excision surgery and when they
return with advanced disease, they have difficulty
understanding why they had too early disease the first
time, and a too advanced disease this time. The presence
of a compensating swan neck reinforces this indication.

Other indications are more controversial. This is the
case in women, as we have not come across any
algodystrophy after AA in women (42 cases), whereas
in our previous study, mentioned above, the rate was
24%. Another debatable indication relates to the very
active patient who cannot take sick leave (but often
t hose are young people).

Contraindications must remain clear: infiltrating
disease, inaccessible multiple cords, post-surgical digital
recurrences, rapid recurrences in young patients, and
severe and long-present digital disease causing the
stiffness of the PIP joint.

These indications and contraindications demonstrate
the undisputable advantages and drawbacks of the
method. It is certainly a simple and quick method with a
short sick leave period, limited care requirements and a
low overall cost. Despite the media pressure, this must
not obscure its drawbacks and contraindications. In
order to retain its safety, it must be practised by
practitioners who understand anatomy and the patho-
logical anatomy of the aponeurosis in Dupuytren’s
contracture, and who are capable of using the full range
of treatment options in order to avoid inappropriate
broadening of the indications.

In conclusion, the needle aponeurotomy, because it is
simple and relatively harmless, deserves its place along-
side the aponeurectomies for certain indications. It
would be a mistake for surgeons to refuse to accord it its
rightful place, thus leaving the way open for technicians
without any surgical training to use it, which may lead
to abuses and major complications because of a lack of
knowledge.
References


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Copyright S1297-3202(01)00035-X/FlA
doi:10.1016/S0168-7081(03)00033-X available online at http://www.sciencedirect.com