Diabetic lipohypertrophy treated with suction-assisted lipectomy

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Abstract. Samdal F, Amland PF, Sandsmark M, Birkeland KI (Department of Plastic Surgery, Norwegian National Hospital; Hormone Laboratory, Aker University Hospital; Oslo, Norway). Diabetic lipohypertrophy treated with suction-assisted lipectomy. Journal of Internal Medicine 1993; 234: 489–492.

Objectives. To investigate the effectiveness of liposuction as treatment for lipohypertrophy in insulin-treated diabetic patients.

Design. Open clinical study.

Setting. Norwegian National Hospital, Oslo.

Subjects. Five consecutive diabetic patients operated on for insulin-induced lipohypertrophy.

Interventions. Syringe-assisted liposuction under local anaesthesia.

Main outcome measures. Change in contours assessed by pre- and postoperative photographs, and by the patients’ and surgeon’s evaluations according to a four-point graded scale.

Results. Good or excellent results were obtained in all patients. Small surface irregularities were seen in two patients who had large volumes of fat removed from the proximal anterior thighs. Apart from this no side-effects or complications occurred.

Conclusions. Insulin-induced lipohypertrophy (‘insulin tumours’) can be treated successfully with liposuction.

Keywords: diabetes mellitus, insulin tumour, lipohypertrophy, liposuction.

Introduction

Lipohypertrophy is the most common local complication in insulin-treated diabetic patients [1]. It is marked by prominent fatty swellings (‘insulin tumours’) at the site of repeated injections. Whilst the introduction of highly purified insulins has reduced the incidence of lipoatrophy, the frequency of lipohypertrophy seems to be unchanged and is reported to occur in about 20–30% of patients [2–4]. The fatty swellings are often less painful for injection and may become convenient areas for insulin administration [4]. Absorption of insulin from areas of lipohypertrophy is variable due to regions of fibrous scarring with less vascularity [5, 6]. In some locations the insulin tumours are disfiguring and in extensive cases they can even result in difficulties in the fitting of clothes.

The introduction of suction-assisted lipectomy [7, 8] has given the plastic surgeon a new and useful tool not only for cosmetic purposes but also for a number of medically indicated procedures such as in the treatment of lipomas/lipomatosis [9], gynaecomastia [10], the correction of uro- and colostomies [11, 12], and for defatting of pedicled or free flaps [13]. In this series we report our experience with liposuction as a treatment for insulin-induced lipohypertrophy.

Patients and methods

Four women and one man with a mean age of 32 years (range 21–42 years) and a history of insulin-dependent diabetes for a mean of 24 years (18–31 years) were referred to our department with subcutaneous prominent fatty masses at one or several of their injection sites. All patients had been treated with a combination of regular and NPH (neutral protamine hagedorn) monocomponent pork insulins for 12–24 years, and for the last 4–8 years they all had been switched to a multiple-dose regimen using human insulin in insulin pens (regular insulin before meals and NPH insulin at bedtime). HbA1c before liposuction ranged from 7.7–14% (normal range 4.8–6.5).
Table 1  Number of insulin tumours in different anatomical regions in five patients

<table>
<thead>
<tr>
<th>Region</th>
<th>Number</th>
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<tbody>
<tr>
<td>Upper arms</td>
<td>4</td>
</tr>
<tr>
<td>Abdomen</td>
<td>3</td>
</tr>
<tr>
<td>Anterior proximal thighs</td>
<td>6</td>
</tr>
<tr>
<td>Lateral proximal thighs</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

4.2–6.1%), and did not change significantly during the period of follow-up. The patients had had their insulin tumours for 1.5–30 years.

One patient had diabetic retinopathy and foot ulcers with recurrent septic infections, and one patient had a slightly impaired renal function with serum creatinine of 130 mmol l\(^{-1}\). The other patients did not have any known diabetic complications.

The patients were operated on with local anaesthesia using a dilute lignocaine solution (0.1%) with added adrenaline 1:1000000 [14]. The solution was injected into the targeted area until the tissue became swollen and firm. Sixty to 500 ml was injected into the different locations. The liposuction was performed with syringe-assisted liposuction as described by Fournier [15] using cannulas with a bullet-shaped tip and a 4–5 mm outer diameter [16]. The treated areas were postoperatively taped with an elasticated dressing (Tensoplast\textsuperscript{®}, Smith & Nephew, Hull, UK) which was removed together with the stitches after 1 week.

**Results**

No postoperative complications occurred in any of the patients and all were discharged from the hospital the following day. The amount of fat removed from each patient was 400–2900 ml (median 1330 ml). Histological examination of the aspirate showed normal or hyperplastic fatty tissue with some increase in the fibrous elements. The number of locations treated is given in Table 1. All patients improved markedly after the liposuction. (Figs 1 and 2.) One patient reported elimination of wide variations in blood glucose levels after the liposuction procedure. The patients’ and surgeon’s evaluations

![Fig. 1](a,b,c) A 21-year-old man with lipohypertrophy in both upper arms and anterior proximal thighs. (d,e,f) Seven months after liposuction of 600 ml fat.
Table 2 The patients' evaluation of the results in 15 anatomical sites treated by liposuction

<table>
<thead>
<tr>
<th></th>
<th>Very satisfied</th>
<th>Less satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper arms</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Abdomen</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Anterior proximal thighs</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Lateral proximal thighs</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

3–10 months (mean 6 months) postoperatively are given in Tables 2 and 3. Small surface irregularities were seen in the treated areas in two patients who had large volumes of fat removed from the proximal anterior thighs. Apart from this no contour deformities or overresection were noted in any of the patients.

Table 3 The surgeons' evaluation of the results of 15 anatomical sites treated by liposuction

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper arms</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdomen</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior proximal thighs</td>
<td>2</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Anterior lateral thighs</td>
<td>2</td>
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</table>

Discussion

Liposuction has been in clinical use for more than 10 years. Initially the procedure was exclusively used as a cosmetic surgical operation but over the years it has demonstrated its usefulness in a number of medically indicated procedures [9–16].

Fig. 2 (a, b) A 32-year-old woman with lipohypertrophy in abdomen and both anterior upper thighs. (c, d) Ten months after liposuction of 2900 ml fat. The patient had not lost weight and the change is the result of liposuction alone. Small surface irregularities can be seen in both thighs postoperatively.
We have found two case reports where liposuction has been used to treat insulin lipohypertrophy [17, 18]. However, liposuction in those two cases did not lead to complete removal of the fatty lumps [17]. To our knowledge the present publication is the first to demonstrate a successfully treated series of insulin lipohypertrophy patients. We consider two surgical points to be important in order to obtain an adequate resection. Firstly, the use of relatively large volumes of dilute local anaesthetics provides a fluid mechanical distention of the targeted fatty tissue and a stretching or dispersing of the fibrous walls, allowing the liposuction cannulae to more easily penetrate the tissue. Secondly, a cannula with a bullet-shaped or semisharp tip will also better penetrate the fibrous fatty tissue than the classic blunt cannula.

Liposuction has several advantages compared with conventional sharp excision. It allows the benefit of surgical debulking without long skin incisions, obvious scarring, and the need of a prolonged recovery period. With the liposuction technique most of the subcutaneous neurovascular plexus remain intact and there is less risk of postoperative haematoma or contour deformities. Our follow-up period is relatively short and recurrence or development of new sites with lipohypertrophy is possible. However, if this should occur liposuction can easily be repeated.

References


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