Chapter 23

Gynaecomastia: an algorithmic approach to surgical management (with special emphasis on liposuction)

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Introduction

Abnormal male breast enlargement is a common benign condition for which treatment is sought if it fails to resolve spontaneously or is too socially embarrasing. Although medical therapies have been described, the gold standard of treatment is surgery. There is a plethora of reported surgical techniques for the correction of gynaecomastia. In contrast there is a paucity of published work on an integrated surgical approach in general and the roles of the different treatment modalities in particular. Common to many plastic surgery conditions the evidence levels for proposed treatments is low.

This chapter outlines the main surgical techniques and presents an algorithmic approach which can assist a surgeon in achieving predictable and safe results. It also provides the evidence for the proposed roles of the different treatment modalities.

Methodology

A Pubmed search was used to gather evidence, using the key words 'gynaecomastia', 'classifications', 'open excision' and 'liposuction'.

Aetiology

Gynaecomastia, or abnormal breast tissue enlargement in men, is the most common breast pathology among males. At puberty, 30-65% of boys have gynaecomastia [1]. This usually lasts for a few months and in almost 75% of them the breast enlargement subsides within two years. The incidence of clinical gynaecomastia in adult males is 36% and its prevalence gradually increases with age [2] to over 60% in the seventh decade [3].

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Table 1. Causes of gynaecomastia. *Adapted from Neuman (1997)* [4] *& Wiseman et al (2004)* [5].

I: Idiopathic

II: Physiological
a.   Neonatal
b.   Pubertal
c.   Ageing

III: Pathological
a.   Congenital disorders: Klinefelter's, anorchia (vanishing testis syndrome), hermaphroditism, androgen resistance syndromes, enzyme defects of testosterone synthesis (some times late onset), increased peripheral tissue aromatase)
b.   Endocrine causes: castration, mumps, Cushing's syndrome, congenital adrenal hyperplasia, ACTH deficiency, hyperthyroidism, hypothyroidism, panhypopituitarism, hyperprolactinaemia
c.   Tumours: testicular (choriocarcinoma, sertoli, leydig cell tumours); adrenal (adenoma, carcinoma); pituitary adenoma; breast carcinoma; tumours that secrete HCG (lung, liver, kidney, stomach and lymphopoietic)
d.   Drugs: hormones (oestrogens, androgens, gonadotrophins); anti-androgens (cimetidine, spironolactone, digitalis, progesterone, cyproterone, flutamide); stimulators of prolactin (phenothiazines, reserpine, hydroxyzine); drugs of abuse (marijuana, heroin, methadone, amphetamines); anti-TB drugs (isoniazid, ethionamide, thiacetazone)
e.   Metabolic: thyrotoxicosis, (altered testosterone/oestrone binding); renal failure (acquired testes failure); cirrhosis (increased substrate for peripheral aromatisation), starvation (same as cirrhosis); alcoholism
f.   Miscellaneous: HIV, chest wall trauma, cystic fibrosis, physiological stress

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Most cases of gynaecomastia are idiopathic (25%) [6]. The known causes of gynaecomastia broadly fall into two categories: physiological or pathological (Table 1). Physiological gynaecomastia occurs in three different age groups: newborn, adolescent and elderly. In the newborn, gynaecomastia is attributed to the influence of transplacental transfer of circulating maternal oestrogen during intra-uterine life. At puberty and in the elderly, however, a relative imbalance between serum oestrogen and androgen levels may be responsible [2]. In the elderly, this results from both declining levels of testosterone and peripheral conversion of testosterone to oestrogen (peripheral aromatisation).

Three basic pathophysiological mechanisms account for the pathological type of gynaecomastia: relative or absolute excess of oestrogens, a decrease of circulating androgens or a defect in androgen receptors. Regardless of the aetiology, the ultimate cause of gynaecomastia is an increase in the effective oestrogen to testosterone ratio, since oestrogens stimulate breast development while androgens inhibit it. Drugs are the most common cause of pathological breast development. Testicular tumours are an equally important although less common cause. Tumours of the Leydig cells of the testis and those originating in the germinal elements act through the production of HCG (human chorionic gonadotropin). Other tumours such as bronchial carcinoma may also induce gynaecomastia via the same mechanism, whereas adrenal tumours cause excessive production of adrenal androgens which are then converted to oestrogen. In hepatic cirrhosis, liver clearance of adrenal androgens is reduced and therefore more are available for conversion to oestrogen in the periphery.

Classification of gynaecomastia

There are many classifications for gynaecomastia [7-9], the most practical being that proposed by Simon [7] (Table 2), as it takes into consideration not only the size of the breast but also the amount of redundant skin. There is still an overlap between the categories leading to subjectivity and inter-observer variability. The classification by Rohrich where the fatty and glandular tissue is determined by pinch test medially, laterally and beneath the nipple-areola complex and grades III and IV have either mild or severe ptosis, has similar limitations [8]. Therefore, we have simplified the Simon classification into two practical categories namely, small-to-moderate size with no or minimal skin excess (Simon's grades I and IIa), and moderate-to-large size with moderate-to-marked skin excess (grades IIb and III) [10]. In addition, breast consistency must be noted as it influences treatment options. Based on its consistency, gynaecomastia has been subdivided by Fodor into true (predominantly glandular hypertrophy), pseudo (predominantly adipose tissue), and mixed (combination of both) types [9].

Patient evaluation

The commonest presenting complaint is social embarrassment, but in some patients breast pain secondary to enlargement can be problematic (55% in grade I) [11]. Pubertal boys with gynaecomastia in the presence of normal growth do not merit complicated laboratory investigations. In patients with abnormal growth, however, approximately half will have an abnormality responsible for their gynaecomastia [3].

Referring clinicians (commonly paediatricians, endocrinologists or general breast surgeons) need to exclude possible underlying medical causes of gynaecomastia. A detailed medical and drug history with special attention to possible thyroid and liver abnormalities is taken. Testicular examination should also be performed to rule out tumours or atrophy. In addition, a biochemical assessment (prolactin, liver function tests, testosterone, oestrogen, T4/TSH, U/Es) is recommended along with mammography and breast ultrasound with or without fine-needle aspiration biopsy if indicated [11]. Most cases of gynaecomastia are bilateral and hence unilateral breast swelling should not be assumed to be gynaecomastia unless breast cancer has been excluded. Clinically the most difficult condition to differentiate from gynaecomastia is adipose hypertrophy without glandular proliferation (pseudo-gynaecomastia). Additional tests (α-FP, ß-hCG, γ-GT, PSA, DHEAs, urinary 17-ketosteroids) may be indicated based on clinical findings and may be necessary in cases of recent or symptomatic gynaecomastia [12]. Extensive work-up is rarely indicated and often does not influence treatment [6].

In the first consultation with the plastic surgeon, a detailed history and clinical examination of the enlarged breasts is necessary in order to evaluate the severity of the gynaecomastia and formulate an appropriate management plan. The salient history includes the patient's age, duration and onset of breast enlargement, symptoms of pain, tenderness, medications, recreational drug use, psychological and social effects and systems review including weight changes and cancer. On inspection, note is made whether the condition is unilateral or bilateral, the

Table 2. Simons's classification of gynaecomastia.

I.	Small visible breast enlargement, no skin excess
II.	Moderate breast enlargement
	a. With out skin redundancy
	b. With skin redundancy
III.	Marked breast enlargement and marked skin redundancy

patient is obese or not obese, and whether there is skin excess, ptosis, or developed inframmamary folds. The skin quality is assessed into poor, fair or normal depending on its potential ability to contract postoperatively. On palpation, the presence of glandular or (parenchymal) tissue, its extent, distribution and proportion versus fat is noted. Any tenderness and discrete masses especially firm sub-areolar discs are determined. The consistency of breasts is also determined (soft, moderate, and firm/hard). Then an appropriate management plan is formulated.

Medical management

Most cases of gynaecomastia especially those occurring during adolescence are benign and self-limiting [1-3]. Therefore, pubertal males should be reassured and observed in the first instance. If there is an underlying cause, this should, however, be corrected (or withdrawn). Treatment is sought when gynaecomastia fails to resolve spontaneously or its emotional and/or psychological impact is unbearable. Medical therapies using testosterone (the non-aromatisable androgen dihydrotestosterone), anti-oestrogens (clomiphene and tamoxifen) and danazol (androgen and pituitary gonatrophin inhibitor) or testolactone (aromatase inhibitor) have limited success and are probably most effective during the active, proliferative phase of gynaecomastia. Irradiation has also been used prophylactically in patients with prostatic cancer treated by anti-androgens [13-15]. In patients with longstanding gynaecomastia (>12 months), the breast glandular tissue should be removed surgically [16] because it will often have progressed to irreversible dense fibrosis and hyalinization [3, 16, 17]. Most patients do not need a trial of drug treatment and are best treated with surgery, which is the mainstay of treatment.

Surgical management

The aim of surgery is restoration of a normal male chest contour while minimising the evidence of surgery and maintaining the viability of the nipple-areola complex. It is indicated in cases of severe gynaecomastia, failed medical therapies or on the patient's request. Post-pubertal gynaecomastia also requires aggressive management in the form of surgery. There are many surgical techniques for treating gynaecomastia varying from open excision and skin reduction to minimally invasive liposuction. Open surgery, primarily through excisional techniques is long established and continues to have a significant role. Over the last two decades conventional liposuction (SAL) and, more recently, ultrasound-assisted liposuction (UAL) have been demonstrated to be effective treatment options. The salient features of the main available surgical modalities are outlined below.

Open techniques (open excision alone /open excision with skin reduction)

Simple open excision of excess breast tissue and overlying skin, as the treatment for gynaecomastia to improve mammary appearance was first described by Paulus Aegineta (625-690 AD) [18]. Although the glandular resection remains the same, many types of incision have been proposed and this subject has been excellently illustrated by Aslan *et al* [19]. They include circumareolar, peri-areolar, transareolar and circumthelial incisions. Today open excision via an inferior peri-areolar approach as reported by Webster in 1946 remains the standard worldwide [20]. Excisional methods, although effective, leave patients with visible (sometimes large) scars. In patients with skin excess (Simon grades IIb and III), skin reduction may be indicated. The optimal timing and method to undertake skin resection remain controversial. The available skin reduction techniques are peri-areolar, lateral wedge, elliptical, inverted-T and LeJour [10, 21-23]. The concentric peri-areolar technique is the most popular because of the less noticeable scarring [21, 22]. In patients with true ptosis or those aiming for completely flat breasts, skin reduction can be undertaken using the LeJour vertical mammaplasty skin pattern [10]. The open transaxillary approach [24] has not gained popularity. All these scars are noticeable even after 12-18 months (Figure 1). Patients with very large and/or ptotic breasts, are suitable candidates for elliptical mastectomy and free nipple grafting [7, 23, 25] **(IV/C)**. This also avoids the telltale features of female-type breast reduction scars. It should, however, be avoided in dark coloured skin because of nipple-areola de-pigmentation.
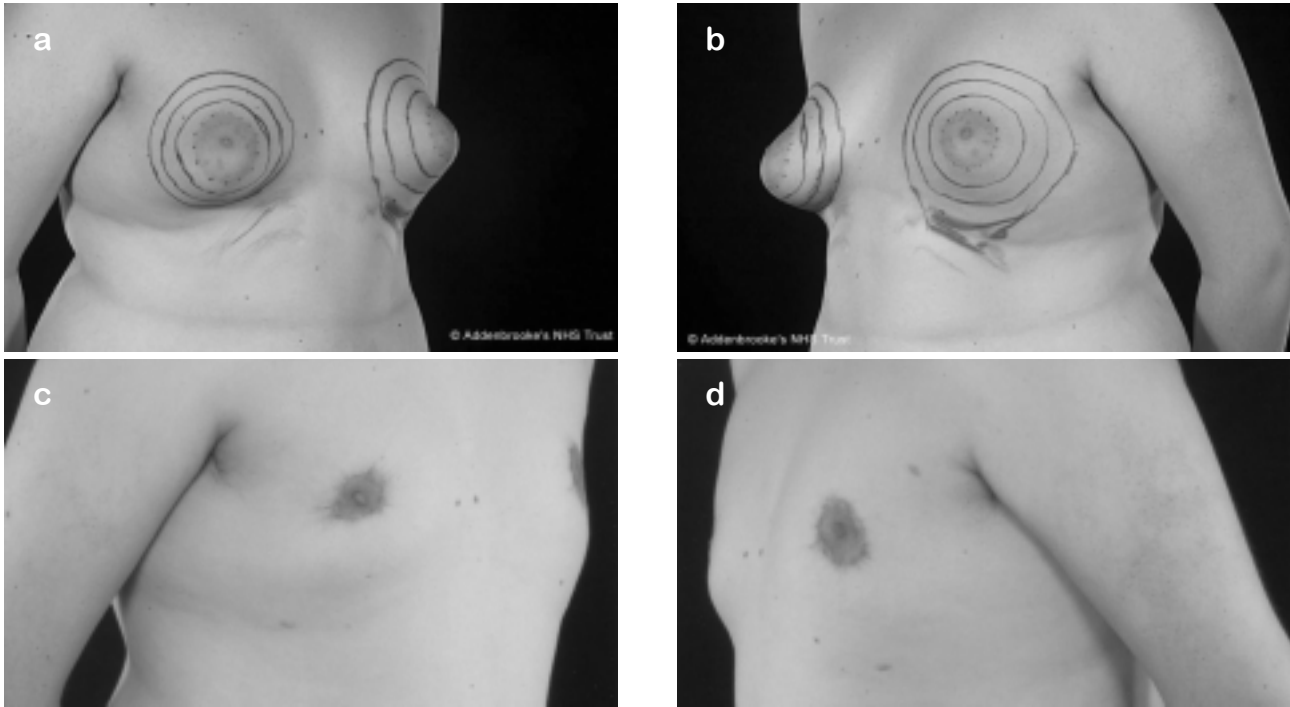
Figure 1. a) and b) A 14-year-old child with idiopathic severe gynaecomastia and moderate skin excess. c) and d) He was successfully treated with SAL and concentric skin reduction.

Table 3. Complications of open excision techniques for correcting gynaecomastia.

- Bleeding and haematoma
- Nipple-areola or skin necrosis
- Contour irregularities (spectrum)
    - Unevenness
    - Depressed nipple-areola
    - Large contour deformities
    - Saucer deformity
    - Nipple inversion
- Noticeable and deforming scars especially with skin reduction techniques

Patients with massive gynaecomastia [21, 26] and those with large anabolic steroid-induced hypertrophy of parenchymal breast tissue [27], are best treated by subcutaneous mastectomy and reduction mammaplasty, because of the extensive glandular enlargement well beyond the areola **(IV/C)**. Patients with Klinefelters syndrome should also be treated by mastectomy because of the increased risk of breast cancer. Rosenberg, however, contends that suction-assisted lipectomy (SAL) with adequate cannulae can adequately treat both early hypertrophy and late fibrous hyalinization of steroid-induced gynaecomastia [28].

In an attempt to reduce unsightly scarring and risk of nipple deformities, less invasive excisional techniques have recently been advocated but have no proven track records. These include endoscopically-assisted techniques [29, 30], the so-called pull-through technique [31] and ultrasound-guided mammatome excision [32]. Open excisional techniques have been associated with high complication rates [32-34] (Table 3), hence the emergence of liposuction as a popular treatment modality. The aim of liposuction is to achieve a smooth, even feel with well-feathered edges.

Suction-assisted lipectomy (SAL)

This conventional liposuction uses a vacuum to aspirate fat through a stab incision via a hollow metal cannula. In gynaecomastia treatment, the liposuction access incisions have been variously sited, on the lateral chest wall (at the level of the nipple), peri-areolar and intra-areolar locations [35-42]. The more distal incisions tend to allow better access to the sub-areolar tissue [43]. Others prefer a separate inframammary fold or anterior axillary fold stab incision [10, 44], because sub-areola tissue is especially hard to remove (suction) via the peri-areolar margin [45].

The breast tissue is infiltrated with solution (wet, super wet, tumescent techniques) to minimise complications such as bleeding. The hydro-dissection of the tumescent technique also facilitates suctioning in the tissue-dense areas and allows easier open excision should this become necessary during liposuction. It is commonly accepted that SAL is useful in selected patients with predominantly fatty breasts and well-located nipple-areola complexes [10]. Teimourian, in 1983, was the first to use SAL to treat gynaecomastia successfully [35]. This was further supported by Rosenberg who contended that all degrees of enlargement, as well as relative proportions of adipose and parenchymal tissue, could be treated with suction lipectomy [39]. He achieved this by using cannulas of different sizes and different cutting types through the peri-areolar incision to remove the tissue beneath the nipple-areola complex. Rosenberg has also advocated aggressive suctioning and broad undermining, increasing with the size of gynaecomastia and the presence or absence of excess skin.

SAL alone

SAL alone has been used successfully for the complete removal of the fat and parenchymal tissue of gynaecomastia [10, 32, 37-41, 46, 47]. Special gynaecomastia cannulas are often necessary to achieve adequate correction of the deformity [28, 46-48]. Cross-suctioning for larger breasts, ptotic breasts, excess skin or well defined inframammary folds makes SAL more effective because it enables more consistent skin contraction and redraping with less waviness and irregularity **(IV/C)**. The inframammary crease can be obliterated by sharp dissection [38] or by suction cannulae [48].

SAL combined with open excision

SAL has been used in conjunction with surgical excision since the early 1980s [32, 35, 36, 38]. Teimourian and later, Lewis, were the first to use SAL in moderate to large cases of gynaecomastia with excision of glandular tissue (by extending the incision if necessary) [35, 36]. The SAL was used in the periphery to smooth the contour. After vigorous suction, the nodules of parenchymal tissue can be sharply removed by scissors, cautery or knife. Rosenberg, however, contends that the individual nodules can be easily suctioned (and sent for histology) [28]. This, however, is not our experience. In patients with severe large soft gynaecomastia with skin excess and/or ptosis, we combine liposuction with concentric skin reduction as popularised by Botta (1998) [49].

In the senior author's experience, conventional liposuction (SAL) alone is useful for diffuse soft to moderately firm breast enlargement, especially in overweight and obese patients **(IV/C)**. However, a residual sub-areola nodule is a frequently encountered complication with this technique [10]. The postoperative persistence of these nodules is often uncomfortable to patients leading to requests for further surgery. Additionally, SAL is not suitable for severe cases or in breasts with primarily fibrous tissue and is associated with a high (up to 50%) incidence of intra-operative conversion to open excision [8, 10] **(IV/C)**. It can be effective in soft breasts even if large, but good skin quality is important for later contraction and avoidance of skin resection. Superficial subcutaneous liposuction also helps to increase the degree of skin contraction [46, 48].

The complications of SAL are minimal (Table 4) and SAL alone has high patient satisfaction similar to ultrasound-assisted liposuction (UAL) [50].

Table 4. Complications of SAL.

◆ Haemorrhage haematoma	◆ Irregularity
◆ Seroma	◆ Skin redundancy
◆ Infection	◆ Asymmetry
◆ Waviness	◆ Residual lump (+/- painful or tender)

Ultrasound-assisted liposuction (UAL)

This technique uses ultrasonic energy transmitted by means of excited piezo-electric crystals located at the terminal ends of suction cannulas to emulsify fat (in tissues infiltrated with a wetting solution), while preserving adjacent nervous, vascular and connective tissue elements [8]. Emulsification is effected through cavitations of fat cells in tumescent fields [8, 51]. After application of the US energy to the tissues, the target area is contoured mechanically by using ordinary SAL cannulae for evacuation and remodelling [51-57].

UAL has been successfully applied to all three degrees of gynaecomastia by a number of workers [8, 10, 52, 53, 55, 56, 58] and is said to have a number of advantages over SAL **(III/B)** (Table 5).

UAL has been documented to be more effective over SAL in dense fibrous lipodystrophy areas of the body such as gynaecomastia, buttocks, back, flanks, upper abdomen and as a secondary procedure. It has thus extended the role of lipoplasty in body contouring in such difficult areas [55, 57]. At higher energy settings it is more effective in removing the denser fibrotic parenchymal tissue that SAL is inefficient at removing [6]. It is, therefore, more effective for firmer breasts than SAL [8, 53, 56, 58]. The incidence of intra-operative conversion to open excision is very low: one out of 22 consecutive cases in the senior author's experience [10, 58]. The UAL amplitude, however, needs to be high (80-95%) [6, 58]. There is a very low rate of revisional or repeat surgery (three out of 43 breasts, <10% versus 26% for SAL after five years). It has also been suggested that postoperatively, UAL results in less bruising and swelling [50, 58, 59] a smoother breast contour and better skin contraction [55, 58, 60] **(IV/C)**. There was no difference in postoperative ecchymosis, swelling, complication rates and skin contraction in one prospective series comparing UAL and SAL [50].

Similar to SAL, UAL used alone cannot correct extremely large gynaecomastia or marked skin redundancy (ptosis). It can, however, decrease the need for (skin) excisional procedures because of the induced skin retraction (although this is not specific to gynaecomastia) [50, 55, 58, 60]. For instance, Kloehn [61] reported that gynaecomastia cases were easy to treat

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Table 5. Advantages claimed for UAL versus SAL.

◆ Selective emulsification of fat (leaving higher density structures undamaged)

◆ More efficient removal of fat in areas with higher densities of fibroconnective tissues such as male breasts

◆ Removal of denser fibrotic parenchymal tissue that SAL is inefficient at removing - at higher energy settings

◆ Better skin retraction in postoperative healing period

◆ Decreased physical demand for large-volume liposuction of the breast

Table 6. **Reported potential complications of UAL.** *After Gingrass, 1999* [59] *and Rohrich et al, 2000* [66].

◆ Thermal and friction burns	◆ End hits
◆ Seroma (other sites 10 - 20%)	◆ Numbness: temporary
◆ Dysethesiae reversible -can be prolonged	◆ Haematoma
◆ Contour irregularities	◆ Asymmetries
◆ Minor surface irregularities	◆ Fibrosis
◆ Skin necrosis	◆ Blood loss
◆ Infection	◆ Scars
◆ Hyperpigmentation	

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with UAL, often requiring some sub-areolar excision, but this has not been our experience to date. With UAL, there is less physical effort by the surgeon which is important in fibrous areas such as gynaecomastia [56, 57, 61-63]. The advantages of less bruising and swelling, smoother breast contour and better postoperative skin retraction, are difficult to quantify. UAL has more potential complications than SAL (Table 6) and therefore requires meticulous safety precautions.

Power-assisted liposuction (PAL)

Power-assisted liposuction (PAL) is also a useful treatment modality. It represents another aggressive surgical approach needed to treat more fibrous types of gynaecomastia [6].

Systematic approach

A unifying approach, which seeks to maximise the strengths of the above treatment modalities, while minimising the drawbacks of each technique, has therefore been proposed [10]. The degree of the gynaecomastia is assessed clinically using a simplification of Simon's classification [7]. The starting point for all cases of gynaecomastia in our practice is liposuction [10]. This is undertaken even in those patients with firm sub-areolar discs in whom open excision is planned. This is because liposuction alone is often effective [10, 37-39, 48] as a single treatment modality (Figure 2). Additionally, even in

patients who pre-operatively need or are intra-operatively found to require open excision, the initial liposuction facilitates the subsequent resection [10, 55, 70] by pre-tunnelling, reducing bleeding and softening of the glandular tissue. It also allows contouring and feathering of the peripheries or surrounding areas, and therefore prevents saucerisation [10, 35, 36, 38] **(IV/C)**. It is technically easier to undertake liposuction at the beginning of the operation rather than after excision. Furthermore, liposuction stimulates postoperative skin contraction [34, 39, 46, 48], although this may be better with UAL [8, 10, 55, 58, 60, 63]. Webster's open excision technique via an inferior peri-areolar incision is indicated for firm/hard sub-areolar lumps and for residual glandular/stromal tissue following liposuction **(IV/C)**.

Patients in whom open excision is not mandated by the pre-operative appearance and consistency, are also routinely consented for open excision in case the liposuction leaves significant residual stromal tissue. This is best achieved by the inferior peri-areolar incision, as it is relatively inconspicuous if correctly positioned at the junction of the areola and chest wall skin [10] **(IV/C)**. Liposuction followed by open excision is very effective in most patients with grade I and II gynaecomastia [5, 32, 35, 36, 38] and has also been advocated for grade III [5] **(IV/C)**.

SAL is only used when UAL is not available because the latter is more efficacious [18, 55-58] and stimulates better skin contraction [10, 53, 55, 58, 60, 64] **(III/B)**. The overall clinical superiority of UAL has, however, yet to be proven by quantitative assessment [50, 63].
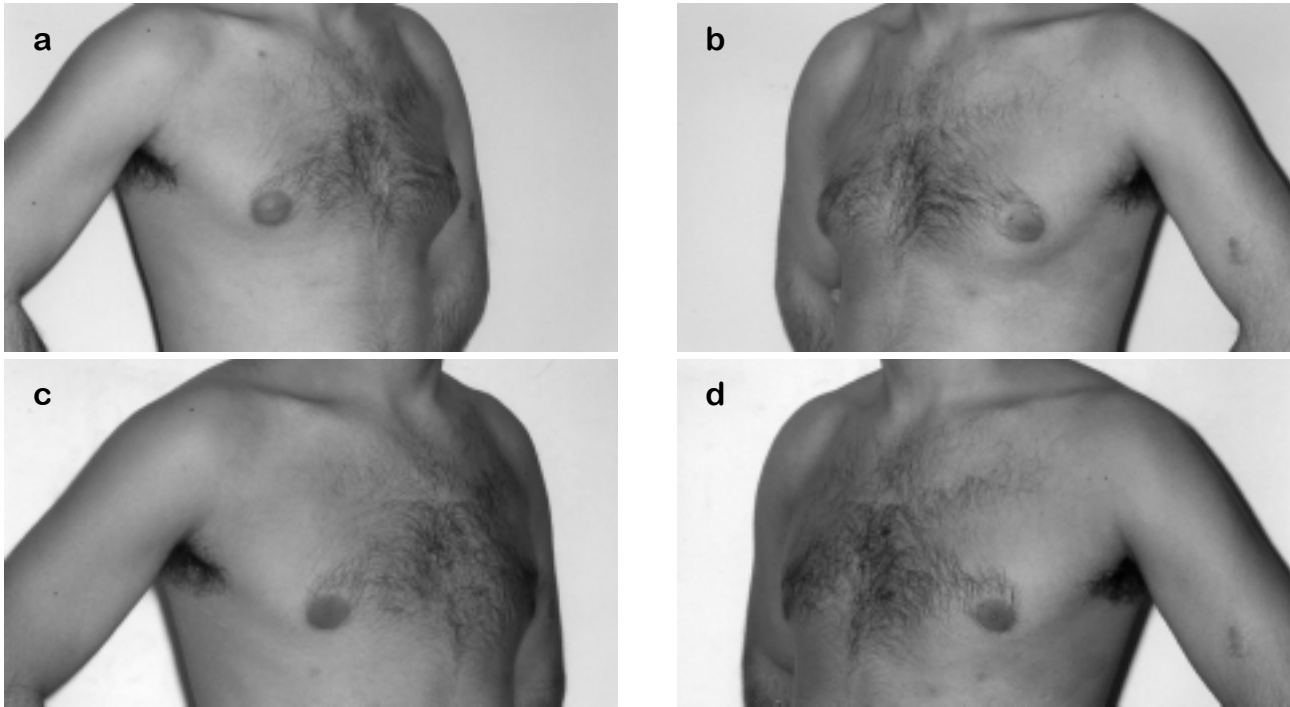
Figure 2. a) and b) A young man with moderate gynaecomastia. c) and d) Successfully treated with UAL alone.

Histologically and biochemically, UAL has been found to be superior to SAL or externally applied UAL [64-66] in terms of adipose cell disruption **(IIb/B)**. In animal models, UAL causes significantly less blood loss compared with traditional liposuction [67] **(IIa/B)**. This has been confirmed clinically by Kloehn [61] in a large series of 600 consecutive patients (30-50% reduction in blood loss compared with traditional or standard suction-assisted lipoplasty) and also by Fodor and Watson [50].

However, the incidence of unplanned intra-operative conversion to open excision is much less with UAL [58] (only one out of 22 consecutive patients over a five-year period) and we have noted a low revisional surgery rate (three out of 43 breasts) compared with a revisional rate of 26% with SAL. It is also less tiring for the surgeon [57, 61-63, 68], who is then 'free' to concentrate on the sculpting [58, 61]. UAL has, therefore, extended the role of liposuction in the management of gynaecomastia patients.

When there is skin excess with or without ptosis, we prefer to address the skin excess at the original operation [69, 70]. This is especially so in cases with poor or borderline skin elasticity. However, patients with large breasts and skin excess may sometimes not need skin resection or may refuse to accept the scars associated with it. These patients can be adequately treated by liposuction with or without open excision of any remaining breast parenchyma [27, 42] **(IV/C)**. In such patients the glandular resection needed after SAL is easily achieved via an inferior peri-areolar incision because the dissection is easier, bleeding is less and the amount of tissue to be removed is significantly less [5, 38, 39]. In the world's largest surgical series to date, Weisman et al have recommended that even for Grade III gynaecomastia a skin-sparing operation (SAL ± excision) should be the operation of choice **(III/B)**. If there is residual skin excess this can be excised in a second stage if needed, i.e. as a 'planned revision'. In cases with borderline skin elasticity, resection may occasionally be necessary after six months. Rohrich et al 2003 [8] recommend undertaking the delayed excision of the remaining ptotic breast skin and/or breast parenchyma six to nine months after UAL to allow for maximal skin retraction.

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                        │  Gynaecomastia   │
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                        │     Clinical     │
                        │   assessment     │
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Consider markings for skin excess in
ptotic/large breasts especially with poor
skin quality

Liposuction
(SAL or UAL) +/- specialist cannulae

Uniform
consistency flattened contour

Residual
parenchymal tissue

Redundant
skin

Open
(parenchyma) excision

Skin
resection (concentric/LeJour) +/- open
parenchymal excision
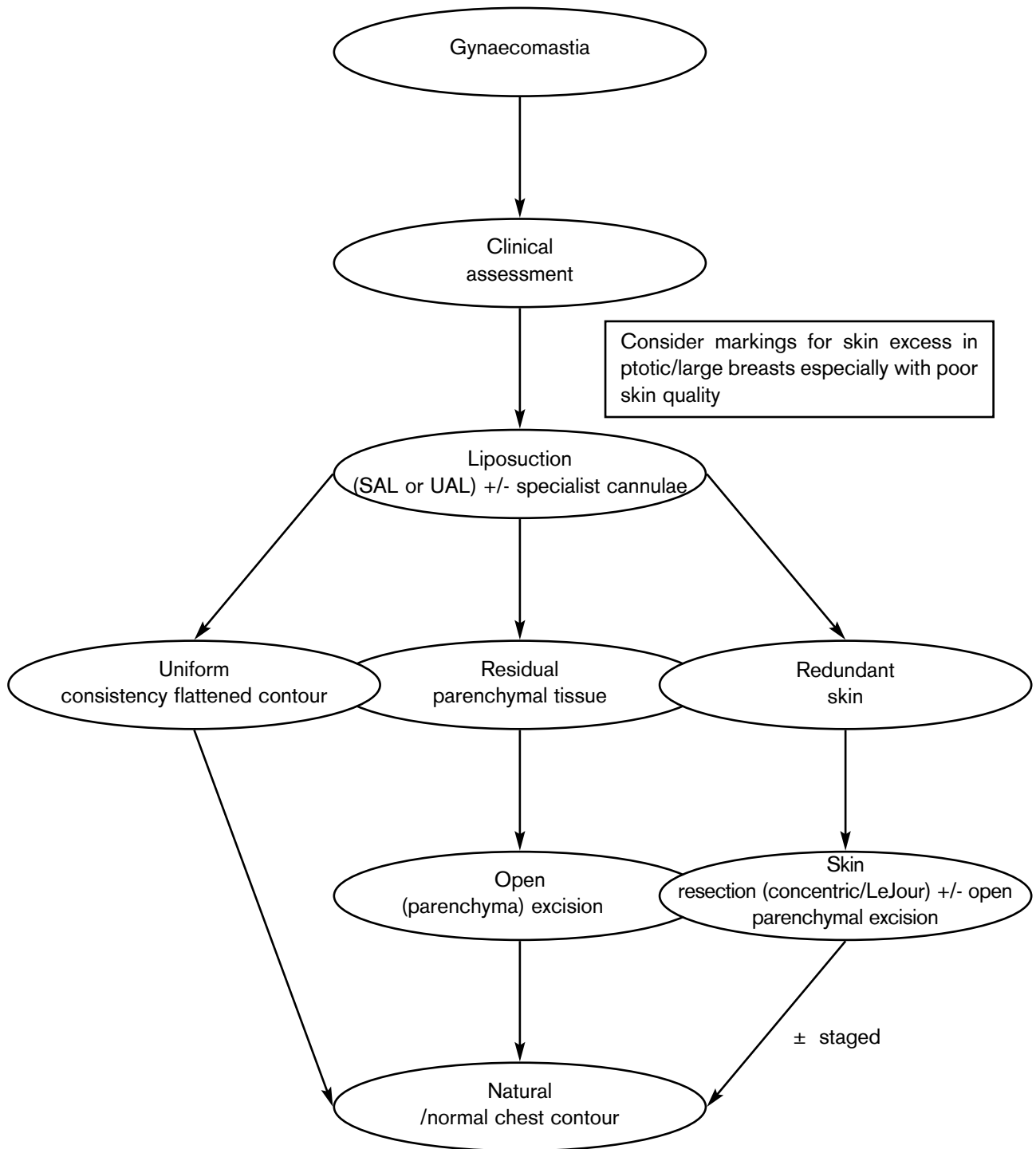
± staged

Natural
/normal chest contour

Figure 3. **Diagrammatic algorithm for a systemic approach to the surgical management of gynaecomastia.**

Patients needing skin reduction also benefit from initial liposuction as it reduces the bulk and initiates some skin retraction; these patients are often obese and therefore need tapering of the breast-fat junction. The peri-areolar concentric mastopexy-type reduction results in pleats or skin folds which settle down satisfactorily after 2-3 months [71, 72] (Figure 1). The peri-areolar Benelli suture is, however, sometimes palpable (not a major problem in men) and its knot needs to be buried deep to the dermis. The vertical component of the LeJour mammaplasty scar, like the lateral wedge excision, is noticeable but leads to dramatic improvement in contour. Surprisingly it is quite well accepted by patients [10]. A lateral gathering and resection of the excess skin has been suggested by some, but it may lead to nipples being positioned too laterally and thus rendering them unnatural.

Skin reduction with its resultant large visible scars is sometimes resisted by patients and thus another approach is to stage the surgery - starting with liposuction followed by subsequent skin resection six months or so later. This potentially reduces the extent of skin resection and hence minimises scarring. Occasionally patients planned for two-stage surgery accept the initial results (some skin redundancy) and decline the second skin reduction procedure. We prefer to reserve skin reduction/excisional techniques for severe gynaecomastia with significant skin excess after attempted UAL/SAL. Severe gynaecomastia (Rohrich grade III and IV) and patients whose glandular component is primarily fibrous tissue, have suboptimal results even with UAL and require staged excision [8].

Conclusions

Although many plastic surgeons can obtain excellent results using many treatment modalities, today's breast surgeon is faced with a plethora of techniques and a logical approach can lead to predictable results in the surgical management of gynaecomastia. The aim of a natural-looking chest can thereby be more consistently achieved.

A diagrammatic algorithm for a systemic approach to the surgical management of gynaecomastia is shown in Figure 3.

Recommendations	Evidence level
◆ In all grades of gynaecomastia, liposuction should always be the starting point.	IV/C
◆ SAL alone can be effective treatment, especially in soft/moderate diffuse gynaecomastia.	IV/C
◆ UAL alone has extended the role of liposuction in all grades of gynaecomastia and is more efficacious than SAL.	III/B
◆ Skin reduction is sometimes required whether SAL or UAL is used.	IV/C
◆ The most effective treatment for firm/hard sub-areolar discs and grade III/IV gynaecomastia remain open excision.	IV/C

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Gynaecomastia: an algorithmic approach to surgical management (with special emphasis on liposuction)

Chapter 23