## GUIDELINES

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- References—maximum of five
- Authors—no more than five
- Figures/Tables—no more than two figures and/or one table

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# Viewpoints

### Zygomaticotemporal Suture Synostosis Causes Progressive Facial Deformity and Asymmetry

***Sir:***

Premature fusion of a facial suture is exceedingly rare. We recently reported the first case of progressive facial asymmetry caused by unilateral zygomaticotemporal suture synostosis.[1] Serial photographs demonstrated that the condition worsened with facial growth. The effects of the sutural fusion were not isolated to the zygoma: the patient also had severe maxillary retrusion, nasal deviation, and sagittal shortening of the ipsilateral cranium. However, the orbits and the occlusal plane were level. The widespread effects of this isolated fusion were enigmatic. We hypothesized that the zygomaticotemporal synostosis stress-shielded normal mechanical strain across patent co-planar sutures, resulting in undergrowth of otherwise normal adjacent bony elements ("co-planar suture theory").[2,3]

In this article, we report another patient with this unusual fusion. A healthy 7-year-old boy was referred to our center for progressive right frontofacial flattening. According to his mother, he was first noted to have minor facial asymmetry at age 1 year, which worsened with growth. No formal work-up was initiated. Physical examination revealed moderate right midfacial and frontal retrusion. His nose and chin-point were deviated toward the side of the fusion, and his occlusal plane was minimally tilted. His orbits were level, and there was no enophthalmos or orbital dystopia. Computed tomography scanning was recommended but was never obtained. Genetic testing revealed normal karyotype studies and a neutral amino acid substitution in *TWIST* exon 1 that was also present in his phenotypically normal mother. This polymorphism has not been previously reported and the clinical significance is unclear.

Two years later, he returned to our unit and exhibited more severe facial and cranial asymmetry. Computed tomography demonstrated patent calvarial sutures and isolated fusion of the right zygomaticotemporal suture (Fig. 1). There was severe retrusion of the right maxilla with moderate flattening of the right frontal bone (Fig. 2). The ipsilateral zygomatic arch, greater sphenoid wing, and temporal and frontal bones were all shorter in the sagittal dimension than on the contralateral side. Midfacial width and vertical maxillary height were similar on both sides. The anterior cranial base was angulated nearly 10 degrees toward the side of the fusion.

On the basis of our previous experience, we anticipated that the hemifacial undergrowth would worsen

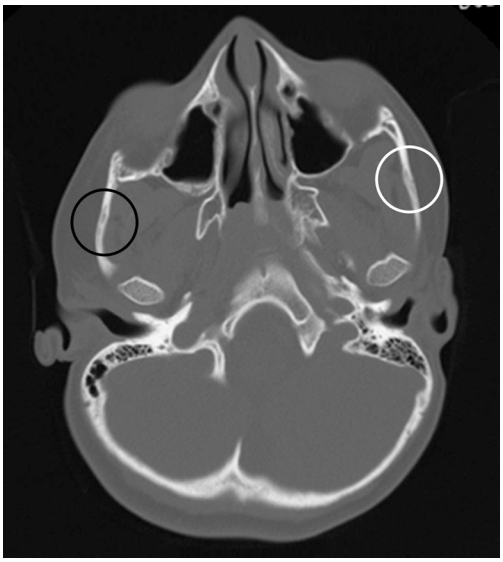

**Fig. 1.** Axial computed tomographic image demonstrating right zygomaticotemporal suture fusion (*black circle*) with shortened and bowed zygomatic process of the temporal bone. The left zygomaticotemporal suture (*white circle*) is patent.

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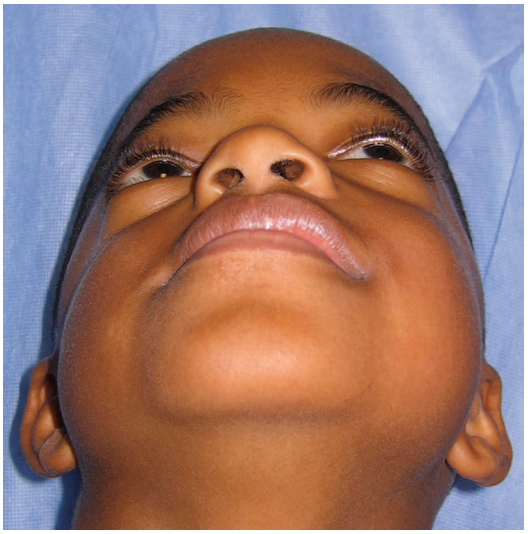

**Fig. 2.** Submental vertex view demonstrating severe retrusion of the right maxilla and moderate flattening of the right frontal bone.

during adolescence. In an attempt to halt the progressive asymmetry, we performed a segmental right zygomaticotemporal suturectomy through an upper buccal sulcus incision. We hypothesized that removing the fusion should allow more normal growth. The effectiveness of this procedure will not be known for several years.

Zygomaticotemporal suture synostosis should be considered in patients with otherwise inexplicable, progressive facial asymmetry. Because this suture is small and irregular, three-dimensional reconstructions are unreliable. The diagnosis is best made using high-resolution computed tomography with thin axial cuts (1 to 2 mm).

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## DISCLOSURE

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## Dermabond Bolster-Assisted Primary Closure of Atrophic Skin

***Sir:***

As surgeons, we are often called to the emergency department in consultation for patients who have sustained traumatic wounds and whose skin is so thin that it will not support sutures. Typically, these wounds are the bane of the plastic surgeon, as the skin shreds after multiple attempts at closure. In addition, these patients can have avulsive skin flaps that may require skin grafting if the injury cannot be addressed by primary closure. We present a technique for using 2-octyl cyanoacrylate (Dermabond; Ethicon, Inc., Somerville, N.J.) as a skin bolster before suturing.

Initial wound evaluation will determine whether simple closure will be an adequate technique. If examination suggests that the skin is too attenuated to hold sutures without tearing, consideration is given to the use of Dermabond to act as a tissue buttress. The wound is thoroughly cleansed, and necrotic tissue is conservatively debrided. The skin is redraped in a nearly anatomic position. Dermabond is then placed approximately 3 mm from each wound edge. Care is taken to prevent seepage of material into the depths of the wound. We advocate creating a wide and thick line.[1,2] After the Dermabond has dried thoroughly, sutures with either PS or P needles are placed through or behind the chemical bolster, moving from areas of least to highest tension (Fig. 1). Complete closure of the wound may be accomplished (Fig. 2). Sutures are removed in a timely fashion, at which time an optional application of Dermabond may reinforce the closure.

Dermabond is a well-established tool for wound closure. It has been used in both elective and nonelective procedures. There are various techniques for usage. Some use it in place of suturing superficial wounds as the only method of wound closure, while others advocate its use after suturing to aid in closure.[3,4] Dermabond has been shown to reduce bacterial counts and appears to have a bacteriostatic effect.[5] It costs approximately $24 per tube.

There is a subset of wounds in which direct primary closure is difficult to achieve due to the tensile strength of the skin. Traditionally, these wounds either would be allowed to heal by secondary intention or would require a more invasive surgical technique, such as skin grafting or flap reconstruction. These methods are as-



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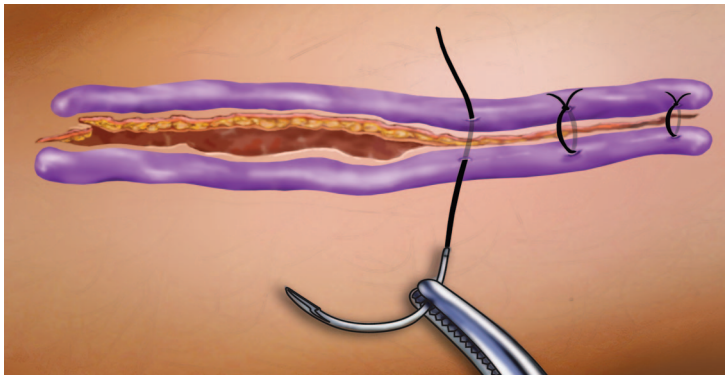

**Fig. 1.** Illustration of technique.

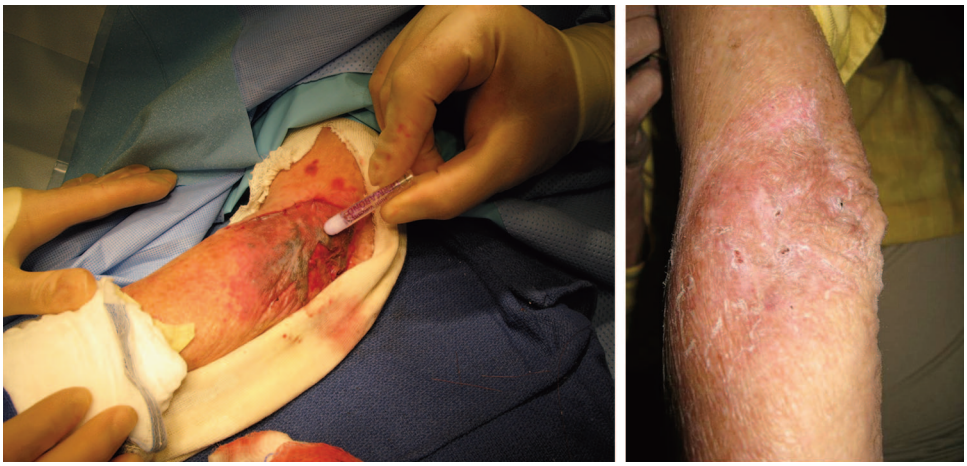

**Fig. 2.** (*Left*) Avulsion injury of elbow with retracted skin flap and application of Dermabond. (*Right*) Three-week postoperative result.

sociated with an increased time to healing, increased morbidity, increased pain, and increased cost. We have used this Dermabond bolster technique to reconstruct traumatic avulsion wounds and elective cancer excisions. We have found that by facilitating the primary closure of wounds with atrophic skin, a high degree of patient satisfaction is achieved in a cost-effective manner. The use of Dermabond as a skin bolster is a safe and easy method that can be used to assist in the primary closure of wounds in patients with thin skin.

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## DISCLOSURE

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## Maternal Reports of Satisfaction with Care and Outcomes for Children with Microtia

***Sir:***

Microtia is characterized by hypoplasia of the external ear and narrowing of the external ear canal. It often requires surgical correction and can present with additional comorbid conditions. To date, little published information is available about treatment outcomes for this defect and accompanying conditions.[1,2] Tanzer[1] evaluated 43 ear reconstruction operations and reported few late postoperative complications, whereas Fraser and Watson[2] studied 17 patients and found recurrent restenosis, skin graft failures, and hearing, speech, and psychiatric problems. Given the improvements in treatment,[3] we queried mothers of children with microtia to identify their satisfaction with care received, additional comorbid conditions, and access to healthcare services for their children.

Children with microtia and their mothers who resided in Arkansas, Iowa, or New York were identified from participants in the National Birth Defects Prevention Study, a population-based case-control study.[4] Eligible children were delivered between January of 1998 and December of 2003 and were diagnosed with microtia but no additional major defects. Birth mothers of these children were asked to complete a computer-assisted telephone interview and results were summarized. The study protocol was approved by the institutional review boards in each state.

Thirty-six eligible children were identified (seven in Arkansas, 11 in Iowa, and 18 in New York), and birth mothers for 20 children (55.6 percent) (three in Arkansas, six in Iowa, and 11 in New York) completed interviews. Most mothers reported being "very happy" with the appearance of their child, although they indicated a need for improvement in patient-provider interactions for information and support received at the time of the diagnosis and for answers received regarding microtia and treatment options (Table 1). Overall, 75 percent of mothers reported that their child received care from an organized specialty care team, but only one-half of mothers in New York ($n = 6$) reported such care (data not shown). Because of the younger age of the sample, only three children (15.0 percent) received ear operations (excluding tympanostomy), although no postoperative complications were reported; one child (5.9 percent) reportedly needed surgery in the previous year but did not receive it. Using a scale of 0 (poor) to 10 (excellent), mothers reported a mean quality score of 8.3 for all medical care received (data not shown).

**Table 1. Maternal Reports of Satisfaction with Care Received, Comorbid Conditions, and Access to Care for Their Child**

| | Maternal Responses | |
|---|---|---|
| **Interview Item** | **No.** | **%** |
| Medical care | | |
| Felt "very happy" about their child's appearance | 13 | 68.4* |
| Very satisfied with the information received from healthcare professionals at the time of diagnosis | 7 | 35.0 |
| Very satisfied with the support and encouragement received from healthcare providers at the time of diagnosis | 10 | 50.0 |
| Received excellent answers for microtia and treatment options | 4 | 21.1* |
| Surgical care | | |
| Care from an organized specialty care team (including at least a surgeon, hearing professional and a speech therapist) | 15 | 75.0 |
| Surgery to repair the child's hearing condition (excluding tympanostomy) | 3 | 15.0 |
| Unable to receive ear surgery in the past year when needed | 1 | 5.9† |
| Hearing | | |
| Child suffered hearing loss | 18 | 90.0 |
| Severity of hearing loss (compared with other children with microtia) | 11 | 68.8‡ |
| Fitted with a hearing aid | 1 | 5.6§ |
| Problems or developmental delays | | |
| Physical delays | 3 | 15.0 |
| Mental or cognitive delays | 2 | 10.0 |
| Emotional or behavioral delays | 4 | 20.0 |
| Access to care | | |
| Personal doctor or nurse for primary care | 19 | 95.0 |
| Healthcare coverage (health insurance, prepaid plans or governmental plans) | 20 | 100.0 |
| Received behavioral or emotional therapy in the past year | 1 | 5.0 |
| Received speech therapy in the past year | 12 | 60.0 |
| Received learning interventions in the past year | 6 | 30.0 |
| Perceived need for specialized therapy (physical, speech, or occupational) for at least a year | 9 | 45.0 |
| Perceived need for additional operations to affect their child's appearance | 15 | 75.0 |

*Percentage based on 19 responses.
†Percentage based on 17 responses.
‡Percentage based on 16 responses.
§Percentage based on 18 responses.

With regard to comorbid conditions, most children (90 percent) reportedly suffered hearing loss; however, only one child (5.6 percent) was fitted with a hearing aid (Table 1). Additional delays in development were also mentioned. Nearly all children (95 percent) reportedly had a primary care practitioner and each had healthcare coverage. Some children received additional care for behavioral or emotional problems (5 percent), speech therapy (60 percent), and learning



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problems (30 percent). In addition, most children (75 percent) were expected to need additional operations.

In summary, mothers of children with microtia were generally satisfied with the care provided, although a need for increased access to an organized specialty care team, improved interactions with healthcare professionals, and a lack of hearing aids were identified. Despite the modest number of participants, our study is the first population-based assessment to measure the baseline needs among parents of children with microtia. Continued follow-up of this sample might provide additional insights into postoperative care and outcomes experienced by these children.

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## The Disappearing Closed Rhinoplasty

***Sir:***

At a time in our specialty when much of our focus is on less invasive techniques, it seems odd that the time-honored closed rhinoplasty procedure is inexorably and inexplicably heading toward extinction. More and more of our face lifts, mammaplasties, and abdominoplasties are being performed with shorter, less visible scars, yet the traditional rhinoplasty, with its simplicity and lack of any external scar, has come to be viewed by many as a historic footnote. Many of the younger plastic surgeons I have met are skilled and comfortable with complex reconstructive techniques, yet the concept of what we older folk have always thought of as a routine "nose job" is dauntingly foreign to them. All they have been taught in their residencies is the open technique of rhinoplasty.

A patient of mine had recently been told by a young plastic surgeon that if she wanted to have the closed technique performed she should go to an older plastic surgeon. Ouch! Disregarding my oversensitivity to ageism, it is interesting to note that the most widely known and busiest rhinoplastic surgeon in my plastic surgeon–flooded neighborhood of Beverly Hills has never once performed an open rhinoplasty.

There is no argument that the exposure of the open technique provides a clearer vision of the nasal anatomy, but at what point in the practice of an experienced plastic surgeon do anatomy lessons become superfluous? We all know the arguments in favor of each technique, and there is no need to elaborate on them in this commentary. Excellent results can be obtained with either method . . . and so can disasters. Like many of my colleagues, I enjoy performing rhinoplasties, and I particularly enjoy the sculptural aspect of seeing and feeling the nose take form *externally* as I work *endonasally.* Yet when I am presented with a more difficult tip (about 15 percent of the time), I do not hesitate to "open it up" and work under direct vision.

Some of our member surgeons have become referral centers for difficult or surgically damaged noses, and the complexities of such a reconstruction present a tangible reason to use the wider exposure. The excellent and numerous books and articles by these authors have given that technique a sense of primacy. The relative dearth of recent publications about the closed procedure has not inspired the diligent resident to learn it. Absent extreme or unusual cartilaginous deformity, a virginal nose with a dorsal hump, a wide bony pyramid, and prominent alar cartilages ought to be considered for closed rhinoplasty.



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Whether I prefer the open or closed technique is not my point. Rather it is to bring to the attention of the readers that a most valuable technique should and must be brought back from the brink of extinction. Our residents need to become much more familiar with the joys and challenges of the closed technique. They may take comfort in knowing that if, later in their practices, they find themselves in a difficult situation, a quick incision across the columella in most cases can bring them back to the anatomy lessons of their youth.
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## The Use of Dermal Fat Grafts for the Correction of Secondary Cleft Lip Deformities

***Sir:***

Surgeons who treat patients with cleft lip deformities face a wide array of challenges, both in the initial repair of the distorted anatomy and in the frequent "touch-up" procedures to improve secondary deformities. Common local techniques include V-Y vermilion advancement, Z-plasties, elliptical excision, Abbé flaps, and Kapetansky flaps.[1,2] When local tissues are inadequate for volumetric correction, a wide range of grafting material is frequently used with variable results.[3,4]

Eight patients underwent cleft lip revision performed by a single surgeon using our dermal fat grafting technique at our facility between 1997 and 2001. The defect was outlined with a surgical marker, and the vertical incision placed on the posterior (oral) aspect of the marking. A subcutaneous pocket was dissected while staying within the markings of the defect, and the dermal graft was harvested. The size and shape of the graft were slightly larger than those of the outlined lip defect, to allow for trimming and slight overcorrection of the defect, since 10 to 15 percent resorption is expected (Fig. 1). The skin to be used was de-epithelialized in situ and excised full thickness with a thin layer of fat on the undersurface of the dermis. The graft was placed on the lip externally and trimmed to fit the defect optimally (Fig. 2). The graft was then drawn inside the pocket using two U stitches of 5-0 chromic gut suture, with the dermis side inward and the mucosal incision closed.

The charts were reviewed along with the standardized preoperative and postoperative photographs. Of the eight patients who underwent cleft lip revision, five had unilateral cleft deformities and three had bilateral deformities. All but one of the patients had a concomitant cleft palate. The average follow-up was 22 months.

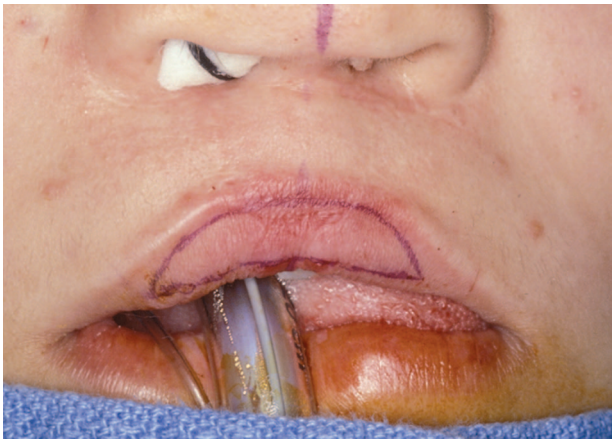

**Fig. 1.** Defect outlined on lip.

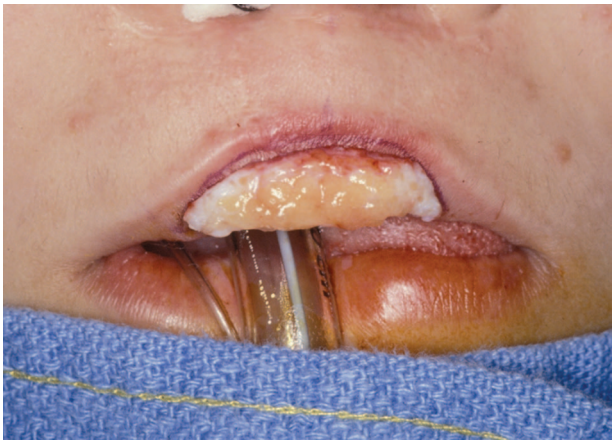

**Fig. 2.** Dermal fat graft overlying defect, trimmed to fit defect optimally with slight overcorrection.

The average age at the time of operation was 12 years. Two of the patients, both with unilateral deformities, were noted to have a "slight excess fullness" on the grafted side but did not require a repeated operation. The initial patient in the series developed a palpable nodule of fat necrosis that required removal in addition to excision of excess vermilion. No other patients required repeated procedures for their cleft lip deformities (Table 1).

The method we have described has yielded consistent and durable results. The technical aspect of harvesting and placing the graft is straightforward and has a shallow learning curve. Our method differs from that reported in another recently published article[5] and features a precisely dissected pocket to define the deficit to be augmented. We prefer to place our grafts with the dermis side down, believing the outwardly placed fat has a softer feel and graft take is better with the dermis adjacent to the labial muscle layer. Grafting can be combined with other procedures, such as V-Y advancement. In addition, the majority of these patients do not require the creation of any other scars, due to



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**Table 1. Patient Data**

| Patient | Cleft | Length of Follow-Up | Age at Time of Procedure (yr) | Repeated Lip Correction | Notes |
|---|---|---|---|---|---|
| A | Unilateral lip and palate | 5.5 yr | 13 | Yes | Fat necrosis nodule removed, excess vermilion excised on cleft side |
| B | Unilateral lip and palate | 3 yr | 11 | No | Slight excess fullness on grafted side; no revision |
| C | Unilateral lip and palate | 2 wk | 15 | No | Good result at 2 wk; incarcerated shortly after surgery |
| D | Bilateral lip and palate | 3 yr | 14 | No | Excellent lip |
| E | Unilateral lip and palate | 3 mo | 15 | No | Very good results |
| F | Unilateral lip | 16 mo | 12 | No | Slight excess fullness on grafted side |
| G | Bilateral lip and palate | 6 mo | 13 | No | Good lip augmentation |
| H | Bilateral lip and palate | 11 mo | 3.5 | No | Good lip repair, recurrent palatal fistula |

the harvest of tissue in the iliac region from bone-graft-harvest donor sites. In the event of incomplete correction, the procedure can be easily repeated for further focused augmentation.

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## DISCLOSURES

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## Second Toe Plantar Flap

***Sir:***

From 1999 to 2007, 15 second toe plantar flaps[1] were transferred to partial skin defects of the digits. Nine of 15 flaps were transferred to traumatic partial distal digital skin defects as sensate flaps, and six flaps were transferred to defects after release of the contractures or primary defects of the palmar side of the proximal fingers without nerve anastomoses.

Among these 15 transfers, circulation could not be observed in two flaps after release of the pneumatic tourniquet. One of these was found to have partial obstruction of the pedicle artery; however, the flap was transferred successfully by utilizing the intact part of the artery for anastomosis. Another case was thought to have diffuse arteriosclerosis of the digital artery of the toe, and the elevated flap was utilized as a full-

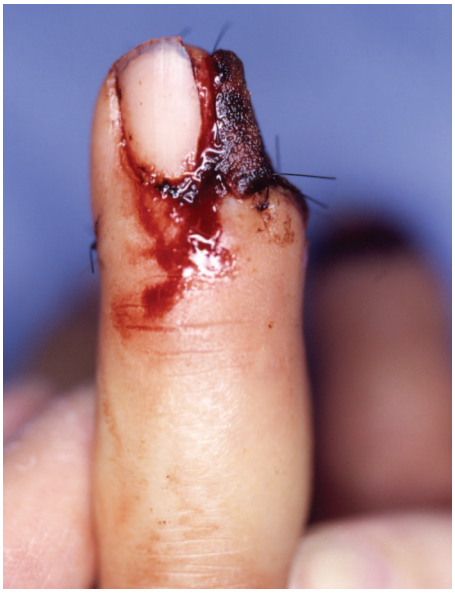

**Fig. 1.** Pulp and partial nail defect of the left middle finger.



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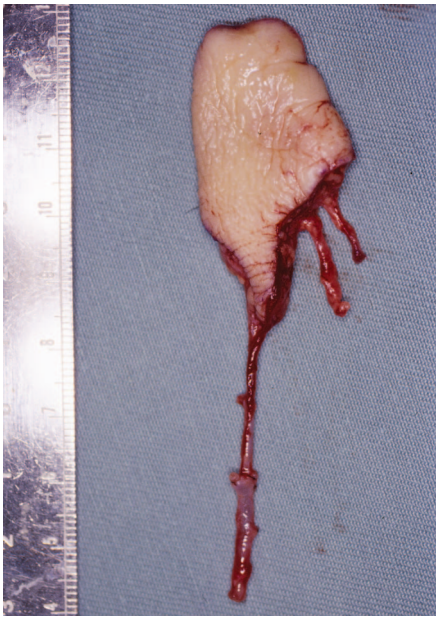

**Fig. 2.** Elevated flap from the left second toe.

thickness skin graft. The other 13 flaps survived completely without any postoperative problems (Figs. 1 through 4).

The Semmes-Weinstein test of seven cases of sensate flap was 2.83 or 3.61, and the average static two-point discrimination was estimated to be approximately 9 mm, ranging from 4 to 15 mm. In addition, six contracture cases acquired almost full range of motion postoperatively. Aesthetic assessments of all 15 cases were almost acceptable because of the similarity of the plantar skin to that of palmar side of the hand.

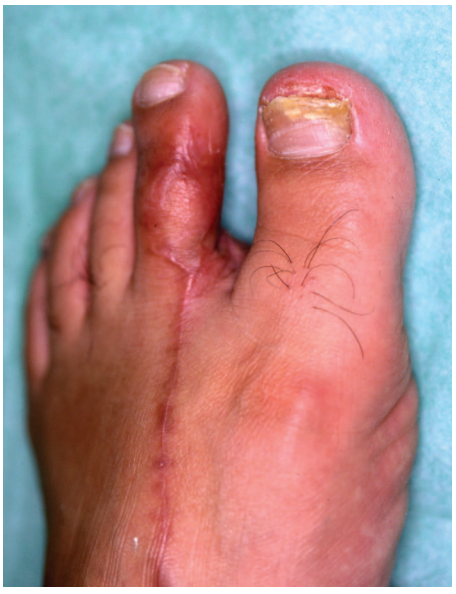

**Fig. 3.** Donor second toe.

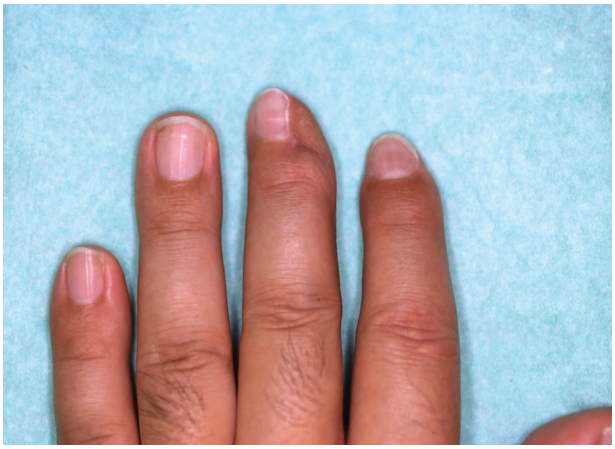

**Fig. 4.** Appearance 6 months postoperatively.

The most typical anatomical variation that affects this procedure is the absence of the connection between the first dorsal interosseous artery and the digital artery. Therefore, the pedicle of the flap should be planned to be as short as possible, as mentioned in the description of the operative procedure.

The most serious problem with this flap is arterial obstructions due to various causes, and it is difficult to detect these causes preoperatively. If the circulation of the flap cannot be observed after elevation, the arterial flow throughout the pedicle should be verified under operative microscopic magnification.

The possible dimensions of the flap are estimated to be approximately $3 \times 6$ cm, extending to the dorsal part of the toe or combined with a second toe hemipulp flap.[2] Even if one side of the digital nerves was harvested with the flap, no complaints about the donor sites covered by full- or split-thickness skin grafts have been received from the patients.

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## Noninfectious Subcutaneous Emphysema of the Upper Extremity

***Sir:***

Subcutaneous emphysema after trauma raises the suspicion for gas gangrene, which complicated 1 percent of open wounds and resulted in high mortality rates during World War I. Since then, cases of noninfectious emphysema of the hand have been reported.

A 30-year-old right-handed woman sustained a laceration of the left forearm (Fig. 1) with an unused kitchen knife. She cleansed the wound and continuously flexed and extended the hand. Within 3 hours, emphysema of the forearm developed.

Nine hours after injury, she consulted her primary care physician, who prescribed oral cephalexin. Thirty-six hours after injury, the patient was reevaluated at an emergency room, where surgical debridement was proposed, given the concern for necrotizing fasciitis. The patient requested a second opinion and was transferred to our institution.

There were no signs of sepsis or vascular, sensory, or motor deficits. The muscles were intact. Subcutaneous emphysema extended from the biceps to the distal forearm. After wound irrigation, the patient was admitted for empiric cefazolin and observation. After 24 hours, she remained afebrile with a stable examination and white blood cell count (7.1 K). A computed tomographic scan revealed subcutaneous emphysema without fasciitis (Fig. 1). Results of a wound Gram stain were negative. On day 3, she was discharged on oral antibiotics.

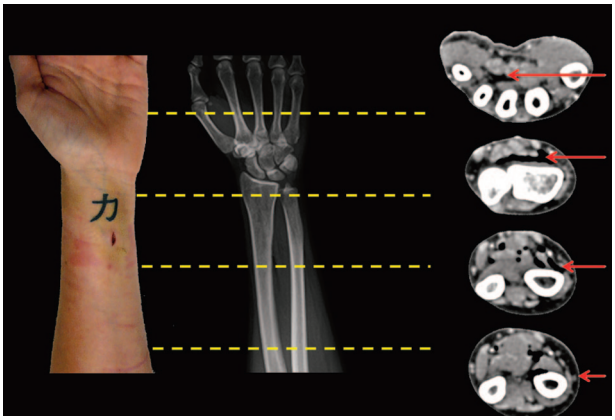


**Fig. 1.** Composite images demonstrating the area of injury and various areas of subcutaneous emphysema on radiographic and computed tomographic scans. Notice the significant dissection in the various planes and cuts on the computed tomographic scan.

Subcutaneous emphysema following trauma raises the suspicion for necrotizing fasciitis. However, incorrectly diagnosing necrotizing fasciitis may result in surgical intervention that may cause unnecessary morbidity in a patient with noninfectious subcutaneous emphysema. Noninfectious causes of subcutaneous emphysema are listed in Table 1.

Cases of noninfectious subcutaneous emphysema have been reported, but only three were published in the plastic surgery literature.[1–3] Brummelkamp reviewed six cases of progressive subcutaneous emphysema following penetrating injuries without sepsis.[4]

Similar injuries were simulated in cadavers. The interdigital folds were punctured to the subcutaneous tissue; negative pressure was generated with adduction. When the measurement needle was left open, subcutaneous emphysema developed.[4]

Noninfectious subcutaneous emphysema may also result from a one-way valve at the wound, which causes air trapping around the extensor tendons. Filler et al. reported three cases, all treated conservatively. The authors emphasized that gas-forming bacterial infection usually develops after at least 12 hours; therefore, soft-tissue gas within 6 hours after injury indicates a noninfectious process. Benign emphysema is confined to the superficial soft tissues, respecting tissue planes and fat pads, while necrotizing fasciitis is associated with intramuscular air.[5]

The following algorithm may be valuable in the management of noninfectious subcutaneous emphysema following trauma (Table 1).

- If the patient remains clinically stable, he or she may be discharged with wound care and oral antibiotics covering skin flora.

**Table 1. Algorithm for the Diagnosis and Treatment of Benign Subcutaneous Emphysema**

| |
|---|
| Diagnosis |
| • History: timing, general symptoms, pain |
| • Physical examination: hemodynamic parameters, edema, skin discoloration, odor, functional limitation, and crepitus |
| Supportive diagnostic tools |
| • Laboratory tests: complete blood count with differential, wound cultures (aerobic and anaerobic) |
| • Imaging: plain radiographs; computed tomographic scan may be considered if there are any changes in the physical examination |
| Management |
| • Hospitalize for observation and serial examinations |
| • Monitor vital signs for systemic infection |
| • Keep the patient *non per orem* in case surgical intervention is indicated |
| • Irrigate the injured area with saline solution; wrap the injured area with elastic bandages |
| • Change dressings every 6 hours |
| • Administer tetanus vaccine or immune globulin depending on vaccination status |
| • Administer broad-spectrum intravenous antibiotics for 24 hours |



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- The patient must be advised of the signs and symptoms compatible with infectious necrotizing fasciitis.
- A follow-up visit is needed to assess wound healing.

In conclusion, the diagnosis of noninfectious subcutaneous emphysema warrants close observation rather than immediate surgical intervention. Distinguishing it from necrotizing fasciitis may avoid an unnecessary surgical intervention.

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## Management of Iatrogenic Breast Deformity after Neonatal Tube Thoracostomy Placement

***Sir:***

Iatrogenic pediatric breast deformity may result from thoracostomy, thoracotomy, or tumor excision.[1] Patients with deformational breast injuries tend to have hypoplastic breasts from breast bud injury and may require augmentation. We describe a novel technique for managing breast deformity associated with neonatal tube thoracostomy.

An 18-year-old woman, born prematurely at 24 weeks, required bilateral chest tubes for respiratory failure as a neonate. She presented with medialization of the breast with a significant chest wall and breast deformity (Fig. 1).

The depressed deformity was marked. The patient was positioned supine with the right arm abducted less than 90 degrees; the depressed scar was released. The deltopectoral fascia was identified and a subglandular pocket was developed. The dissection extended from the costal margin to the sternal notch and inframammary fold.

The tethered breast parenchyma was divided longitudinally. The subglandular flap was advanced and the breast tissue was sutured along the anterior axillary line to create volume and to lateralize the breast mound. The objective was to release the tissue aggressively so it would fill the defect.

After 3 years of follow-up, the patient remains satisfied with the result. The breast contour was restored and remained symmetrical when compared with the contralateral side. There is adequate excursion, and the scar is mildly noticeable.

Breast development begins at 5 to 7 weeks of fetal development as a bilateral thickening of the ectoderm which involutes shortly after forming. However, a limited portion in the thoracic region remains and develops into the neonatal breast.[2,3]

In infant cadaver dissections, the breast bud tissue (mamma ductules and glands) is distributed at least 1.5 cm around the nipple-areola complex.[4] Therefore, dissection or trauma in this area may damage future breast tissue and lead to incomplete breast development.[5]

A common pediatric breast injury results from tube thoracostomy. The site develops a scar that may tether breast tissue to the chest wall, leading to a localized contour deformity. Scar release is necessary to allow normal breast growth during puberty.

Breast hypoplasia may result from thoracotomy with violation of the breast bud. Thoracotomy incisions must be placed to avoid this complication.[4] In these cases, breast implant placement might be required.

The proposed technique achieves a tension-free reconstruction with an acceptable aesthetic result. Furthermore, there is adequate tissue excursion without tethering.

Possible limitations include the lack of fullness in the lateral aspect of the breast and the lateralization of the nipple-areola complex. These findings were present preoperatively. Furthermore, the patient gained weight between the time the preoperative and postoperative images were taken. Interestingly, the corrected breast gained proportional volume at the surgical site; therefore, postoperative healing has not impeded fat accumulation. Although the results are encouraging, Cherup et al. found volume differences greater than 20 percent in 60 percent of patients who underwent thoracotomy as children.[4]

The subglandular breast advancement flap may be a valuable tool for breast malformation reconstruction after tube thoracostomy.

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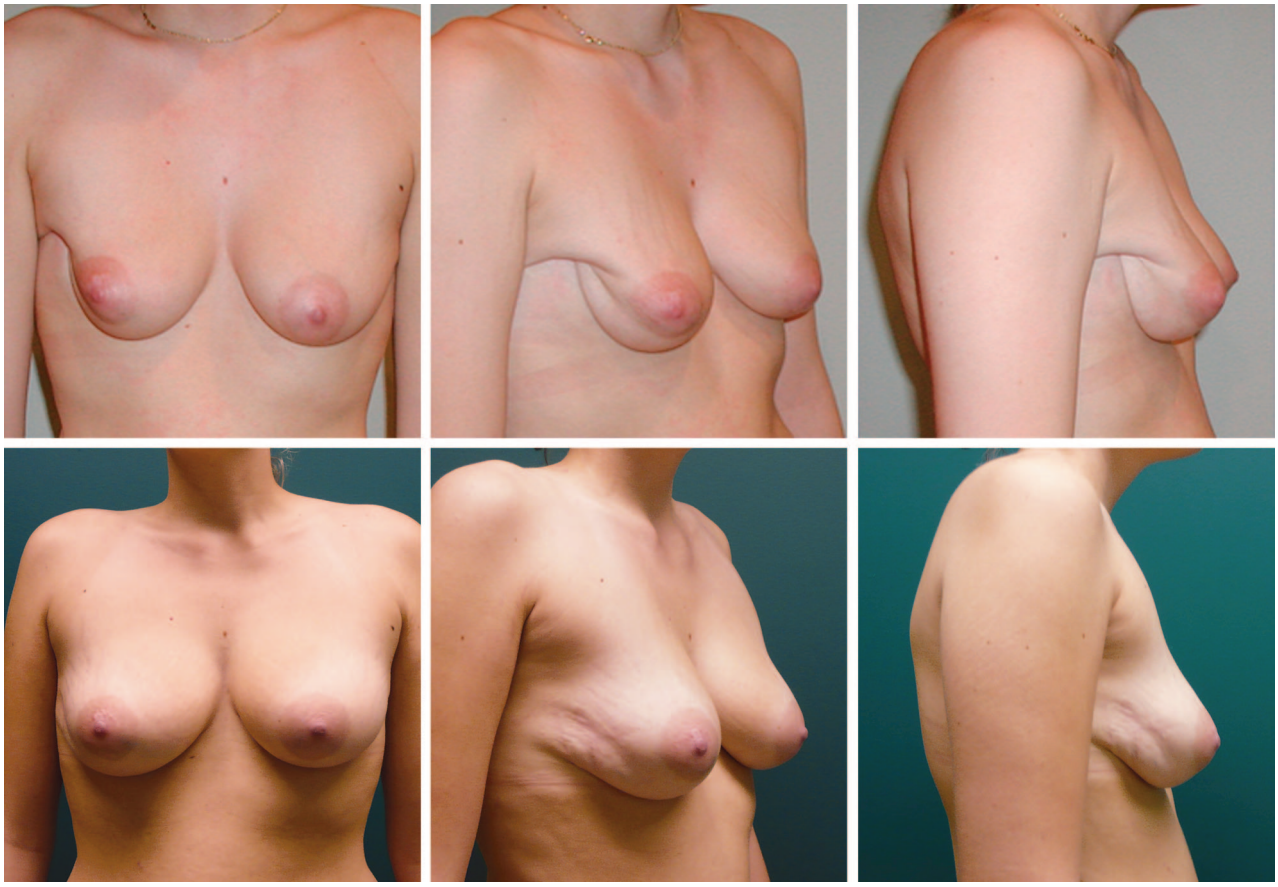

**Fig. 1.** (*Above*) Preoperative frontal, three-quarter, and lateral views. The lateral aspect of the right breast is displaced 4 cm medially, with the midaxillary line displaced anteriorly. (*Below*) Postoperative views show that breast contour was restored.

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## Determination of the Nipple-Areola Complex Position on the Male Thorax

***Sir:***

The widespread diffusion of bariatric surgery has created a complex group of massive weight loss patients presenting with extremely complex contour deformities requiring lifts in areas previously rarely seen.[1] Male breasts are one of the most disturbing body regions that can be difficult to treat. They often require nipple-areola repositioning. At present, there is a growing awareness of male breast aesthetic appearance, and patients of all ages are seeking surgical correction. So far, there are no universally established and accepted criteria for nipple position in males.[2] Various measurements have been suggested in the literature. With currently available



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**Table 1. Definitions of Parameters Measured**

| | |
|---|---|
| SN-N | Suprasternal notch – nipple distance |
| SN-AC | Suprasternal notch – acromioclavicular joint distance |
| SN-AX | Suprasternal notch – anterior axillary fold distance |
| CM-N | Clavicular midline – nipple distance |
| U-AX | Umbilicus – anterior axillary fold distance |
| U-AC | Umbilicus – acromioclavicular joint distance |
| U-N | Umbilicus – nipple distance |
| U-X | Umbilicus – nipple horizontal plane distance |
| SN-X | Suprasternal notch – nipple horizontal plane distance |
| SN-U | Suprasternal notch – umbilicus distance |
| N-N | Nipple – nipple distance |
| CM-AX | Clavicular midline – anterior axillary fold distance |

guidelines, there is a common tendency to place nipple-areola complexes too high and too far medially.[3,4]

Thirty young male volunteers were sampled at random and various measurements were made (Table 1 and Fig. 1, *left*). Our results demonstrated that the optimal male nipple vertical (SN-X) and horizontal (N-N) coordinates can be determined with only two easily measurable distances, U-AX (umbilicus–anterior axillary fold) and SN-U (suprasternal notch–umbilicus), which are in golden proportion (golden number = 1.618, golden number reciprocal = 0.618). Internipple distance can be calculated with 95 percent accuracy (N-N = 0.618 × U-AX), and the distance from the suprasternal notch to the horizontal NN plane can be determined in 80 percent of cases within a range of 3.33 ± 1.25 cm. The upper limit of this range is SN-X1 = SN-U – (0.618 × SN-U) = 0.618 × U-X1, and the lower limit is SN-X2 = 1.618 × N-N/2 = U-AX/2 (Fig. 1, *right*).

Photographs of all subjects were taken in the fixed controlled position. Digital measurement of all parameters was performed with UTHSCSA Image Tool for Windows version 2.0 and compared with manual measurements for conformity. Microsoft Office Excel 2003, Minitab 14 for Windows 2003, and SPSS 15.0 for Windows were used to perform calculations and statistical analyses, including confidence significance, regression analysis, analysis of variance, Mann-Whitney test, Kruskal-Wallis test, and paired *t* test. The Kendall tau test was used to measure the degree of correspondence between measured and calculated N-N values as well.

Contrary to other studies that have proposed complicated mathematical formulas and abstract ratios and numbers that cannot be easily remembered, the formula we are proposing relates the umbilicus–axilla and suprasternal notch–umbilicus distances to the golden number, a well-known number since antiquity with a strong connotation to aesthetics, harmonious proportions, art, and architecture.[5] Even though there may be some sampling problems with any volunteer population, our analysis of the data has provided helpful mean values and guiding tools. It seems that exact determination of internipple distance is more "eye catching" and aesthetically important than the vertical location of the N-N plane and that slight vertical malposition can be tolerated. In the final analysis, even with the accuracy attainable with the best formulas, final surgical decisions must be dictated by the surgeon's sense of sculptural form, as there still is no substitute for adequate preoperative evaluation and surgical talent, experience, and skill.

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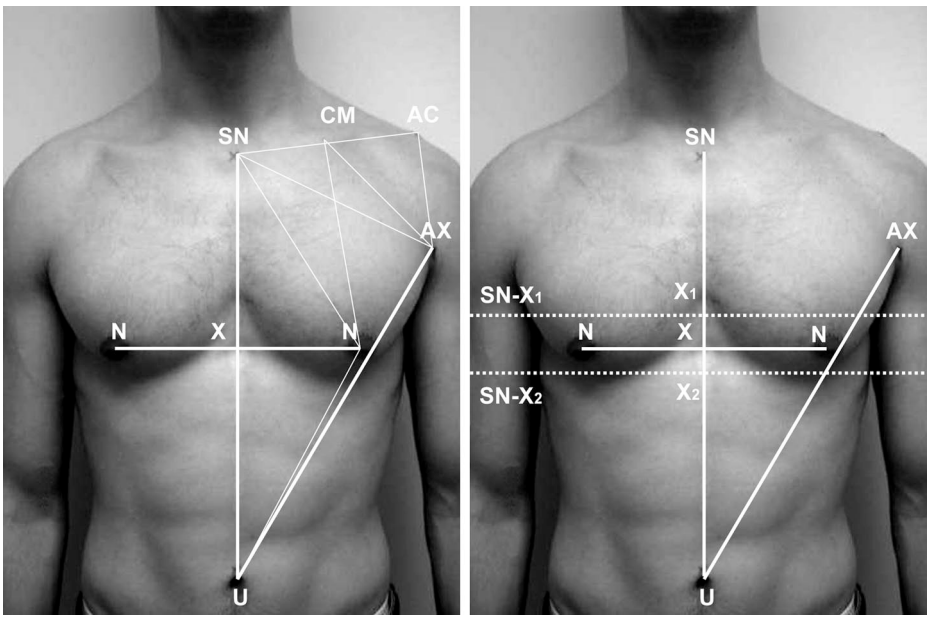


**Fig. 1.** Measurements and calculations made to determine horizontal and vertical coordinates of nipple position. N-N = 0.618 × U-AX; SN-X1 = SN-U – (0.618 × SN-U) = 0.618 × U-X1; SN-X2 = 1.618 × N-N/2 = U-AX/2.



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## Postoperative Seromas after Abdominoplasty: A Retrospective Analysis of 494 Patients and Possible Risk Factors

***Sir:***

Abdominoplasty is a procedure that manifests postoperative seromas in 5 to 22 percent of cases.[1,2] Different risk factors have been investigated. Although age and body mass index have been associated with their occurrence,[3] progressive tension sutures gave contrasting results, and the use of drains or concomitant liposuction was not related to seroma occurrence.[4] In this retrospective analysis, we tried to correlate the risk of seromas with the amount of flap resected and of fat aspirated with liposuction. We also analyzed the influence of associated liposuction, progressive tension sutures, fibrin tissue adhesives (Tissucol), patient smoking status, and two techniques for flap raising (diathermocoagulation versus cold knife).

Data were retrospectively collected from the personal archive of two surgeons (A.A. and V.C.) working at the Dolan Park Hospital, in Bromsgrove, United Kingdom, and at the Plastic Surgery Department of the University "Tor Vergata," in Rome, Italy. We excluded from the analysis morbidly obese and postbariatric patients who had undergone panniculectomy following massive weight loss. A total of 494 patients who underwent full abdominoplasty were analyzed (A.A.: September of 2004 to December of 2007; V.C.: January of 2001 to December of 2007). Descriptive statistics and clinical characteristics are summarized in Table 1.

We recorded 23 seromas (4.7 percent) and 34 hematomas (6.9 percent). Wound infections were present in 60 patients (12.1 percent). They occurred after a mean period of 8 ± 3 days. The most common organism isolated was *Staphylococcus epidermidis.* No cases of deep vein thrombosis or pulmonary embolism were observed.

The chi-square and Mann-Whitney tests confirmed that groups (seromas versus nonseromas) were homogeneous for all variables analyzed, except for the amount of flap resected during the abdominoplasty (Table 1). The analysis of smoking status in both groups produced no significant differences, nor did the amount of flap aspirated with liposuction, the use of tissue adhesives, or the use of diathermocoagulation versus the cold knife approach. The comparison between groups produced a prognostic cut-off value for the amount of flap removed (Figs. 1 and 2). This value

**Table 1. Descriptive Statistics and Clinical Characteristics***

| Variable | All Patients | No Seromas | Seromas | *p* |
|---|---|---|---|---|
| No. of subjects | 494 | 471 | 23 | — |
| Age, years | 47 (±11) | 46 (±10) | 47 (±11) | NS† |
| Sex (male) | 215 (43.5%) | 204 (43.3%) | 11 (47.8%) | NS‡ |
| Body mass index | 26 (±3) | 26 (±3) | 25 (±2) | NS† |
| Smokers | 221 (44.7%) | 208 (43.5%) | 13 (56.5%) | NS‡ |
| Associated liposuction | 366 (74%) | 349 (74%) | 17 (73.9%) | NS‡ |
| Fat removed with flap resection, kg (range) | 0.5 (0.1–1.9) | 0.5 (0.1–1.9) | 0.7 (±0.1–1.9) | <0.005† |
| Fat aspirated with liposuction, kg (range) | 0.2 (0–0.7) | 0.2 (0–0.7) | 0.2 (0–0.7) | NS† |
| Diathermocoagulation | 293 (59.3%) | 278 (59.0%) | 15 (65.2%) | NS‡ |
| Progressive tension sutures | 194 (33.4%) | 95 (33.7%) | 4 (28.6%) | NS‡ |
| Fibrin tissue adhesive (Tissucol) | 45 (15.2%) | 43 (15.2%) | 2 (14.3%) | NS‡ |
| Hematomas | 34 (6.9%) | 34 (7.2%) | 0 | NS‡ |
| Wound infections | 60 (12.1%) | 56 (11.9%) | 4 (17.4%) | NS‡ |

NS, not significant.
*Values are expressed as median (range) and frequencies.
†This analysis was conducted with the Mann-Whitney test for continuous variables.
‡This analysis was conducted with the chi-Square test for categorical variables.



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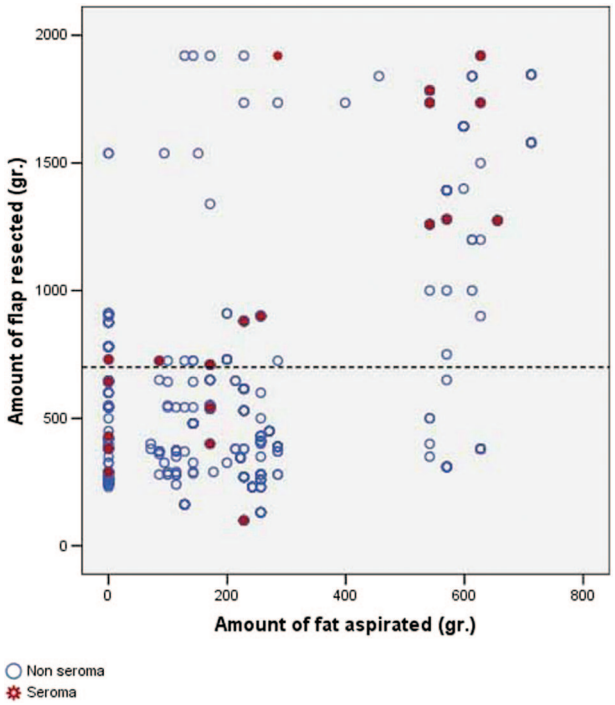


**Fig. 1.** Scatter plot with cut-off line for the amount of flap resected of patients who experienced seromas (*red circles*) versus those who did not (*blue circles*).

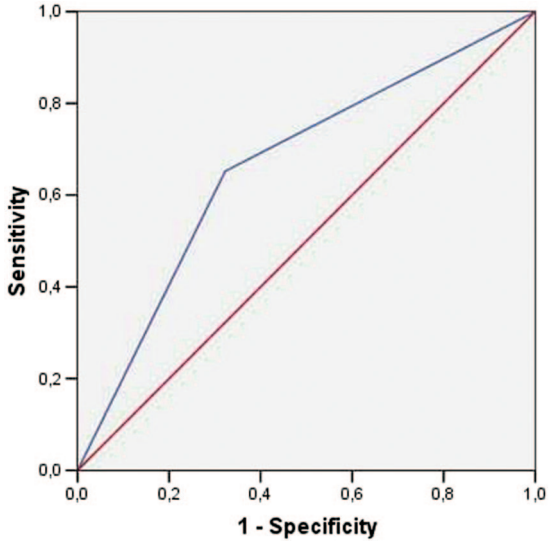


**Fig. 2.** Area of receiver operating characteristic (*ROC*) curves refers to cut-off of tissue removed. Diagonal segments are produced by ties.

(700 g) was determined with receiver operating characteristic curves to find the greatest areas of sensitivity and specificity (area = 0.665). According to this cut-off, the relative risk for the incidence of postoperative seromas in patients who removed more than 700 g of fat was 3.8 compared with the others [(15/167)/(8/327)] (chi-square test; $p < 0.001$).

Results of our study suggest that the amount of fat removed during surgery could be an important factor for the occurrence of postoperative seromas, increasing their risk of occurrence almost four times when the quantity removed exceeded 700 g. We previously demonstrated that the quantity of fat removed influences the risk of pulmonary embolism when it exceeds 1500 g,[5] and our personal observations also suggest a relationship with the occurrence of postoperative surgical-site infections. No other factor was associated with the occurrence of seromas, especially concomitant liposuction or the use of progressive tension sutures. However, although based on a large series, our analysis is retrospective in nature and the results obtained need to be confirmed in future prospective trials.

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## External Fixation: Indications in Lower Extremity Reconstruction and Limb Salvage

***Sir:***

Mechanical disruption of soft-tissue reconstructions during ambulation predisposes the lower extremity to failure in limb salvage. Common mechanisms of disruption include dehiscence secondary to motion and pressure necrosis due to ineffective unweighting of wounds on the plantar foot.

Although techniques such as splinting and total contact casting can effectively immobilize and offload wounds, they are limited by difficulty accommodating routine wound care and do not guarantee immobilization. Obesity, uncoordination, incapacitation of the contralateral limb, neuropathy, and spasticity all contribute to weight-bearing restriction compliance rates as low as 28 percent.[1]

To address these limitations, the use of external fixators to support free flap soft-tissue reconstructions of the lower extremity was reported by Bufford and Trzeciak in 2003[2] and described again by Sagebien et al. in 2007.[3] To identify other potential indications for external fixation to support soft-tissue reconstructions in the absence of skeletal pathology, we reviewed our limb salvage database from 1999 to 2004 and identified 24 consecutive patients in whom external fixation was used solely to support soft-tissue reconstruction after conventional offloading and immobilization techniques had failed.

In 12 of these patients, a multiplanar external fixator with a footplate was used to ensure offloading of wounds on weight-bearing surfaces (Fig. 1). Reconstructions of these wounds included one delayed primary closure, five skin grafts, seven local flaps, and two free flaps. The overall limb salvage rate in this group was 83 percent, and the mean time to healing was 128 days after frame application (compared with failure of healing for 285 days before frame application). There were six complications (50 percent), including four pin-site infections (33 percent) and two failed salvages that ultimately required amputation (17 percent). Wounds recurred in five patients (42 percent) at a mean period of 192 days after removal of the frame and resumption of protected ambulation.

In the other 12 patients, a monoplanar external fixator was used to definitively immobilize wounds near mobile joints (Fig. 2). Reconstructions included three wounds that healed by secondary intention after immobilization only, two delayed primary closures, two skin grafts, and five local flaps. The overall limb salvage rate in this group was 73 percent, and the mean time to healing was 66 days after frame application (compared with failure of healing for 232 days before frame application). Complications in this group consisted of two pin-site infections (17 percent). Wounds recurred in two patients (17 percent) after removal of the frame and resumption of protected ambulation.

Our initial experience suggests that the indications for external fixation to support soft-tissue reconstruction in the lower extremity may be expanded. In addition to supporting free flap reconstructions, external fixation can provide total offloading of a variety of reconstructions on weight-bearing surfaces and definite immobilization of reconstructions near mobile joints when other modalities fail. The technique appears to hasten healing, although pin-site infec-

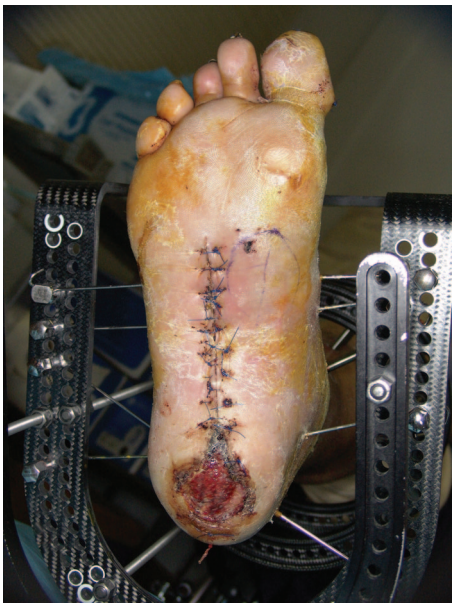

**Fig. 1.** Use of a multiplanar external fixator with footplate to definitively offload the plantar surface of the foot.

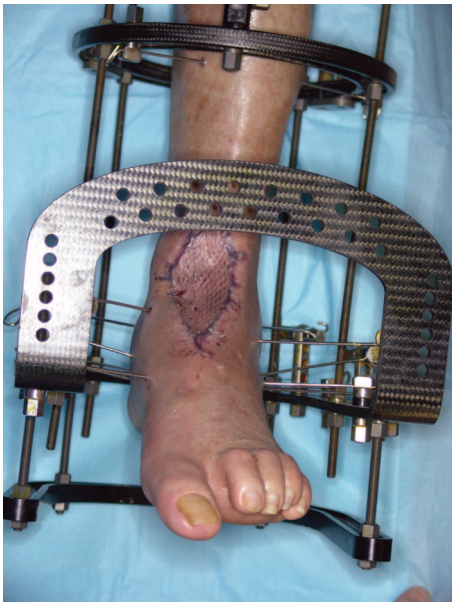

**Fig. 2.** Use of a multiplanar external fixator to immobilize the ankle and facilitate healing of the local flap and skin graft reconstruction over the mobile extensor mechanism of the foot.



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tion was a frequent complication in our diabetic limb salvage population.
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## Vascular Supply of the Tensor Fasciae Latae Flap Revised

***Sir:***

The lateral aspect of the thigh is an important donor site for flap harvest due to the high number of type B and C perforators suitable for pedicled and free tissue transfer. The tensor fasciae latae flap, originally described by Hill (in *Plastic and Reconstructive Surgery* in 1978), represents an important source of soft tissue for composite and functional reconstructions.

We read with interest the article entitled "Tensor Fasciae Latae Perforator Flap: Minimizing Donor-Site Morbidity in the Treatment of Trochanteric Pressure Sores,"[1] in which the authors recognized the ascending branch of the circumflex femoral artery as the unique source of vascularization of the tensor fasciae latae muscle in 100 percent of the dissected legs.

We performed a review of the related literature using plastic surgical journals and PubMed as the main sources of information. Among these articles, we found an important discordance about the identification of the main source of this muscle.

Koshima et al.[2] described the transverse branch of the lateral circumflex femoral system as the primary vascular supply of the tensor fasciae latae muscle; Kimura,[3] in agreement with Ishida et al.,[1] recognized the ascending branch of the lateral circumflex femoral artery as the main source of the muscle. Rifaat and Abdel Gawad,[4] in accordance with Koshima et al.,[2] found the transverse branch of the circumflex femoral artery to be the main source of all of their flaps ($n = 12$).

In an ongoing cadaveric dissection study, we have dissected 31 lower limbs injected with latex. We found the tensor fasciae latae muscle to be supplied in 74 percent from the ascending branch of the lateral circumflex femoral artery and in 13 percent of the sites from the transverse branch of the lateral circumflex femoral artery; in another 13 percent, the artery supplying the tensor fasciae latae was found to arise directly from the common femoral artery or from the deep femoral artery. In four thighs we noticed a secondary arterial supply nourishing the tensor fasciae latae muscle by arising from either the ascending or the descending branch or directly from the femoral artery (Fig. 1).

The variability about the origin and branching pattern of the lateral circumflex femoral artery has already been reported.[5]

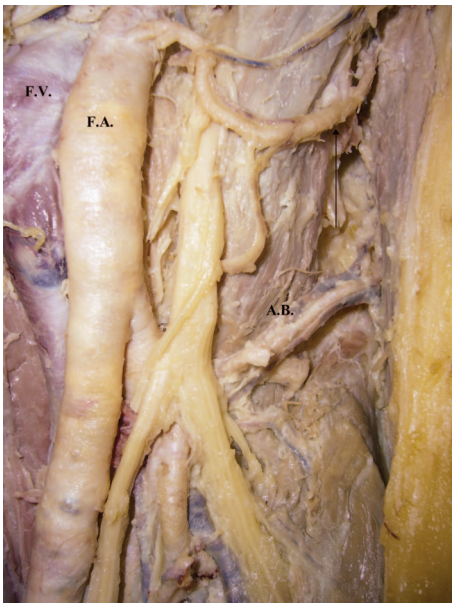


**Fig. 1.** Left side of the groin of an injected cadaver in which the source vessels to the tensor fasciae latae have been dissected. *F.V.*, femoral vein; *F.A.*, femoral artery; *A.B.*, ascending branch of the lateral circumflex femoral artery; *arrow*, secondary source from the femoral artery.



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The aim of this short report about the main source of the tensor fasciae latae flap (as a muscular, musculocutaneous, or perforator flap) is to invite surgeons to exercise caution during the deep dissection of the pedicle, as its vascular supply presents a higher variability than previously reported.

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## Macroscopic and Microscopic Proof of Long-Term Survival of Gluteal Fat Transplantation

***Sir:***

The adipose tissue seems to be a nearly ideal material for use as a permanent soft-tissue substitute. In 1989, after observing Fournier performing fat tissue transplantation onto the lower limbs to correct sequelae of poliomyelitis, we introduced to our practice the concept of autologous fat transplantation for gluteal, trochanteric, and inner aspect of the thigh fat enhancement.[1]

A 32-year-old woman presented with complaints of having "no buttocks," which made her "unattractive" (Fig. 1, *left*). A composite body-contouring procedure was offered to her, commencing with liposuction of the back, flanks, and abdomen. Gluteal fat transplantation was performed. The following volumes were placed in one procedure: right gluteointramuscular, 180 ml; left gluteointramuscular, 190 ml; right gluteal subcutaneous space, 50 ml; left gluteal subcutaneous space, 60 ml; right subgluteal sulcus, 40 ml; and left subgluteal sul-

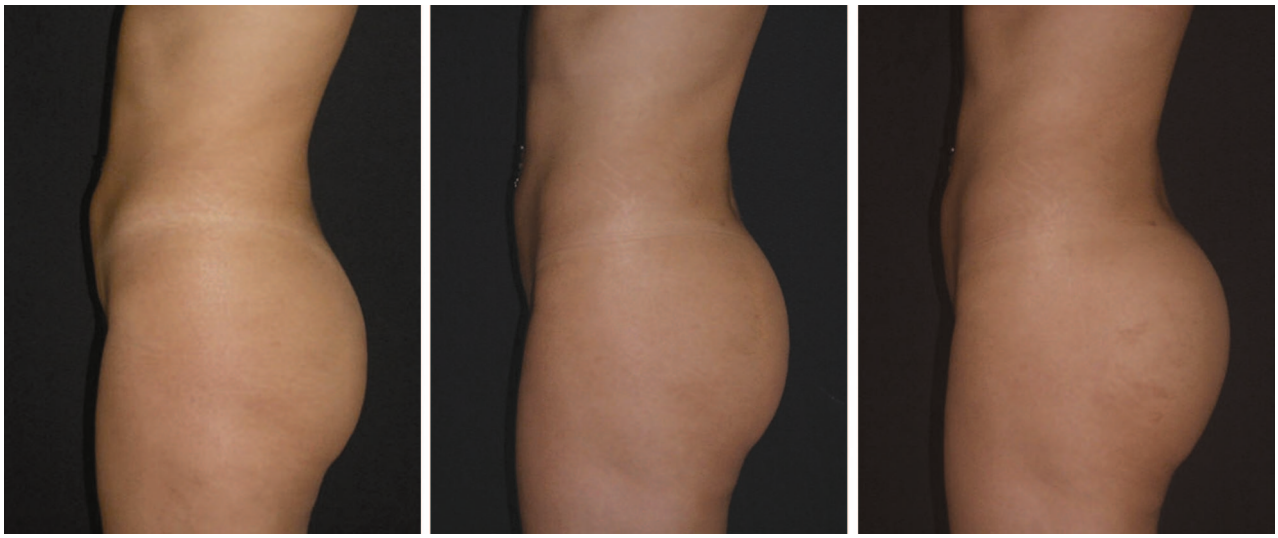

**Fig. 1.** (*Left*) Preoperative view of a 32-year-old patient's gluteal area. (*Center*) Postoperative view 5 years after the gluteal fat transplantation. (*Right*) Postoperative view 1 year after insertion of the gluteal silicone implant.



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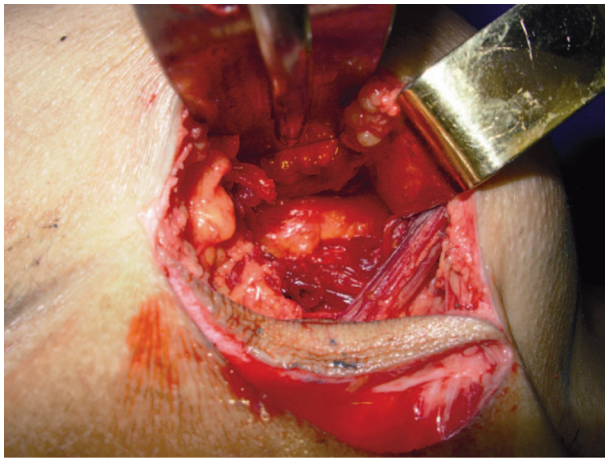

**Fig. 2.** The "lipoma-like formations" in the intramuscular plane.

cus, 30 ml. Figure 1, *center*, shows the result at 5 years after the procedure.

Although the patient declared her satisfaction, she expressed the desire to further augment her gluteal area. After evaluation of the availability of autologous fat, it was decided that to meet her objective it would be better to insert gluteal silicone implants.

A 250-cc quartz-type gluteal silicone implant was inserted bilaterally. This implant is produced by Silimed Comércio de Produtos Médico-Hospitalares Ltda, in Brazil. Intraoperatively and when the intramuscular plane was created for positioning of the implants, several "lipoma"-like tissues were observed inside the muscle (Fig. 2). Histological examination reported the presence of "lipoma-like formations" attached to the gluteal muscle. The postoperative result 1 year after the insertion of the gluteal silicone implant is shown Figure 1, *right*.

The macroscopic observation and the histological examination in this particular case confirm, for the first time in clinical practice, what published experimental animal studies have shown: that the intramuscular survival and revascularization of injected fat is a fact.[2–4]

In 2000, a 7-year experience of the senior author in the grafting of aspirated fat in the gluteal region of 233 patients was presented. In 90 percent of cases, the results were considered satisfactory.[5] Although in this specific case the long-term survival of gluteal fat grafting was proven clinically and histologically, a small percentage of patients may need to undergo further fat augmentation or insertion of a gluteal silicone implant to achieve the desired result.

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## A Simple Way to Locate Tissue Expander Injection Ports

***Sir:***

Tissue expanders with integrated metallic injection ports are typically packaged with port finders that rely on a unidirectional swiveling magnet. This device must be passed over the suspected location of the injection port in two perpendicular axes to identify the center of the port. Despite the use of such devices, inadvertent needle puncture of tissue expanders still occurs, with obvious undesirable consequences. The ideal port finder should be easy to use

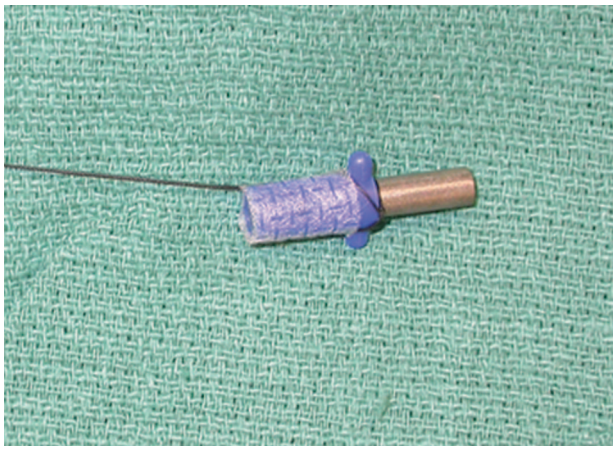

**Fig. 1.** Magnet removed from unidirectional device and tied securely with a Steri-Strip.



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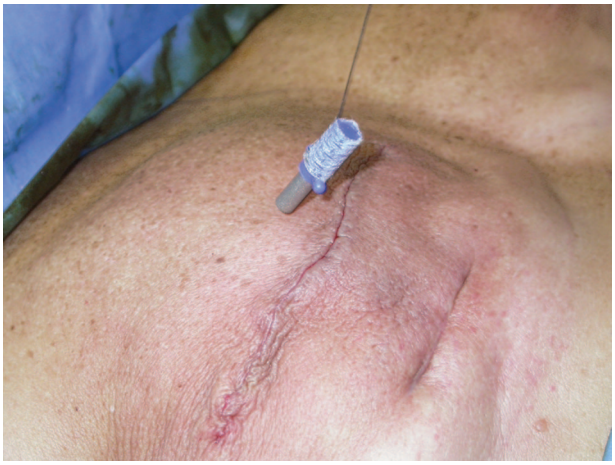

**Fig. 2.** The magnet is held over the expander to quickly and accurately locate the center of the injection port.

(by both physicians and staff) and very precise. While working with surgeons at Plastic & Hand Surgical Associates, in Portland, Maine, I learned that by removing the magnet from a conventional port finder and hanging it from a tie, it is converted into a pandirectional device that quickly identifies the exact center of the injection port (Figs. 1 and 2). Although some manufacturers incorporate multidirectional magnets into their port finders, others do not. Modifying the port finder as described simplifies and improves the accuracy of locating tissue expander injection ports.

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