

Outcomes²⁰⁰⁶

Plastic Surgery





Outcomes | 2006

Quality counts when referring patients to hospitals and physicians, so Cleveland Clinic has created a series of outcomes books similar to this one for its institutes and departments. Designed for a health care provider audience, the outcomes books contain a summary of our surgical and medical trends and approaches; data on patient volume and outcomes; and a review of new technologies and innovations. We hope you find these data valuable. To view all our outcomes books, visit Cleveland Clinic's Quality Web site at clevelandclinic.org/quality/outcomes.





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Chairman's Letter |



Cleveland Clinic's outcomes booklets were initiated at Dr. Cosgrove's suggestion three years ago. Our charge was not to generate a marketing brochure, but to describe our surgical results in a clear and succinct fashion for our patients, referring physicians, alumni and friends. I am, therefore, pleased to present our third edition of Plastic Surgery *Outcomes*.

As in previous years, the quality and outcomes measures of the brochure are divided into cosmetic and reconstructive sections. The cosmetic section covers the various areas of facial cosmetic surgery, hair transplantation, innovative means of pain control following aesthetic surgery and means of maximizing wound healing following cosmetic procedures. In the reconstructive area, approaches to breast reduction, breast cancer, problems in upper extremity, peripheral nerve surgery, breathing problems and innovative closure of cleft lip wounds are addressed.

Our department is a leader in clinical and translational plastic surgery research. This is evidenced by the numerous publications cited in facial transplantation, immunotherapy, bone substitutes and peripheral nerve research as outlined in the section entitled "New Knowledge." Finally, the department contacts and staff listings tell you of the variety of locations around the city and suburbs where you can be seen.

If you seek us out, I promise that you will find focused and dedicated individuals eager to solve each and every problem you bring to us. It is our hope that you find our Plastic Surgery *Outcomes* booklet both informative and helpful.

Please call on us.

James E. Zins, M.D.

Chairman, Department of Plastic Surgery
Editor-in-Chief



Department Overview |

With the addition of five new staff members in 2006, the department continues its strategic plan to expand at the main campus and in the eastern and western suburbs. In addition to the Beachwood and Strongsville satellites, new staff and plastic surgery expertise have been added to the Lorain, Solon, Westlake and Willoughby Hills suburban locations.

A major initiative in the past year and a half was the development of free tissue transfers for breast reconstruction. The Deep Inferior Epigastric Perforator (DIEP) flap, which minimizes injury to the abdominal wall while providing an ideal breast reconstruction using the patient's own tissue, has become a frequent means of breast reconstruction at Cleveland Clinic. A strong microsurgical team was developed to perform these complex procedures. The team consisted of two surgeons with microsurgical expertise added to our already adept and experienced microsurgeons. This procedure, performed in large numbers at only a few centers in the United States, is rapidly evolving and expanding and is expected to be a magnet that will draw patients from all over the Midwest.

Activity in cosmetic surgery continues to grow and the plastic surgery team continues to seek out innovative means to enhance our surgical results. These include new minimally invasive techniques to reduce recovery time and enhance surgical results, new methods to reduce postoperative pain and recovery room and hospital stay, methods to enhance healing and reduce complications through the modulation of the wound healing process, and the use of autologous (the patient's own) blood products to reduce complications and enhance surgical results (see "Innovations" section).

In 2006, our plastic surgery staff was on the forefront of hand and peripheral nerve surgery. They developed the means of reducing pain and reversing pain syndromes with the use of peripheral nerve stimulators and self-administered continuous-infusion catheters that deliver local anesthetics to the surgical wound. These techniques have reduced pain and converted some operations from inpatient to outpatient procedures.

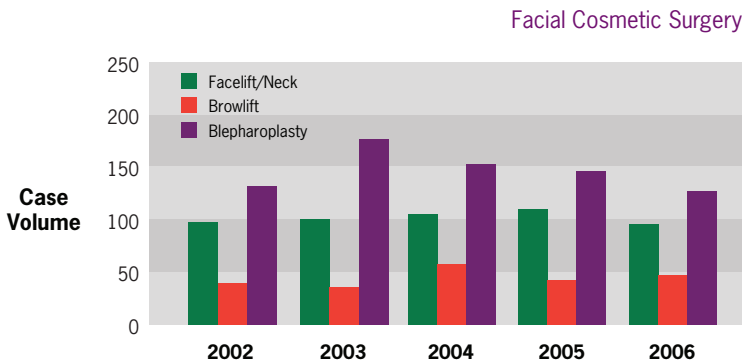


The department continues to work towards its first face transplant. Both clinical and research laboratory innovations bring this closer and closer to reality.

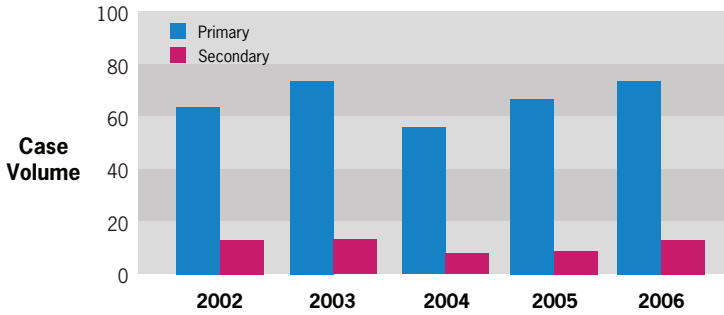
Maria Siemionow, M.D., Ph.D. again co-authored a plastic surgery research paper, among the six final papers, vying for the prestigious prize, the James Barrett Brown Award, for the best paper of the year in plastic surgery.

The dental department became part of the Department of Plastic Surgery in late 2005 and spent its first full year as the Section of Dentistry within the department. The Department of Plastic Surgery continues to develop synergies between the two specialties, including cosmetic surgery and orthognathic surgical combined efforts. Finally, it is expected the Section of Dentistry will complete a major relocation of a significant portion of the department to the eastern suburbs in 2007, bringing state-of-the-art dental care to new and convenient patient locations. The eastern suburban location is the first expansion of dentistry to the suburbs in the history of Cleveland Clinic and, if successful, additional moves to the south and west will follow.

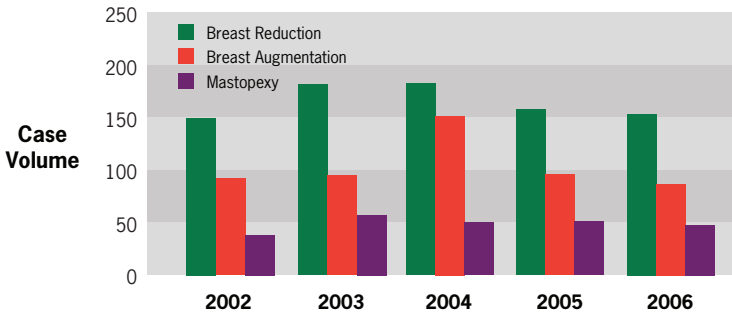
We look toward 2007 with great anticipation and enthusiasm. Tremendous growth is expected in the department, both at the main campus and in our new suburban locations. The future is bright and the department is poised for the challenges of 2007 and beyond.



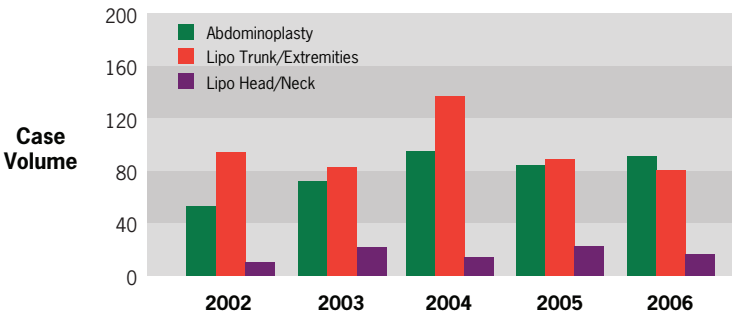
Rhinoplasty



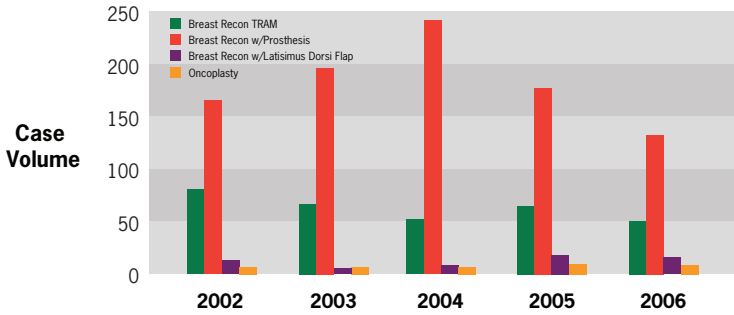
Cosmetic Breast Surgery



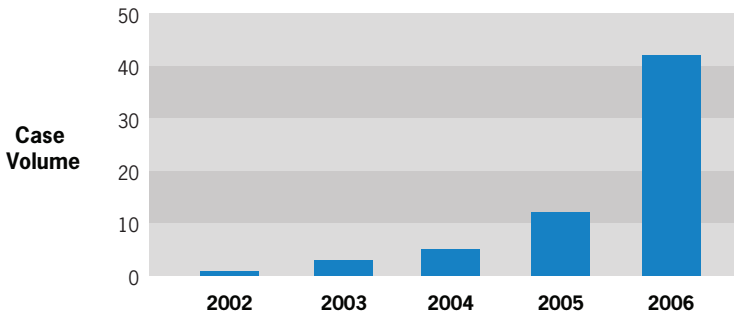
Body Contouring



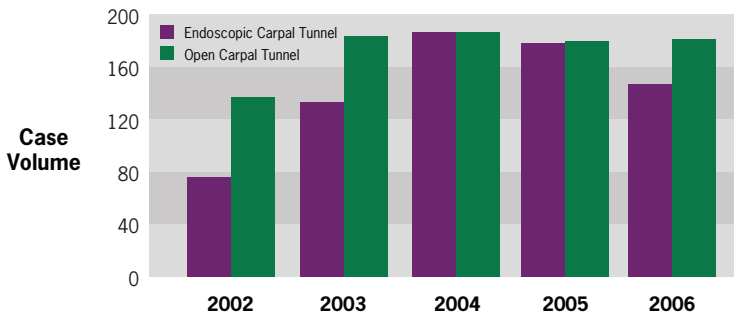
Breast Reconstruction



Breast Reconstruction Microsurgery



Carpal Tunnel



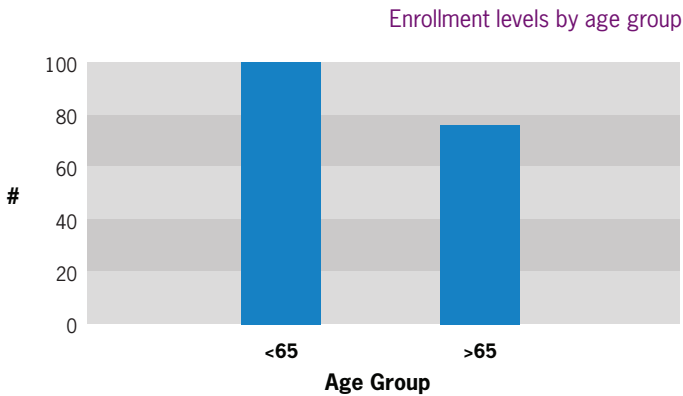
Quality & Outcome Measures |

Cosmetic

Facelift Surgery in the Elderly

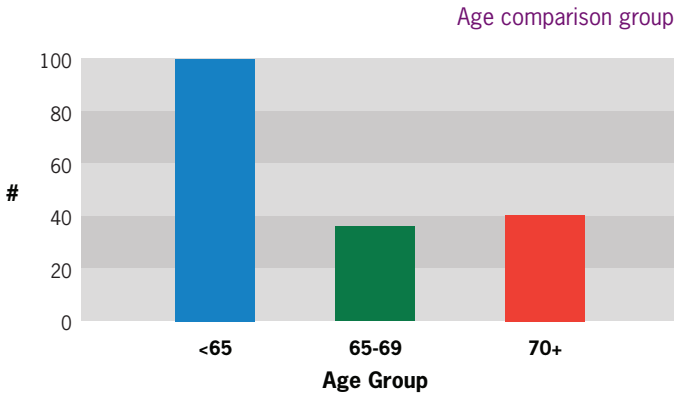
In recent years, cosmetic surgeries have received wide-spread publicity. All age groups, all ethnicities and all socioeconomic populations have developed an interest in actively participating in some type of cosmetic surgery. A number of lay and professional articles focus on plastic surgery for the young. Paradoxically, few studies focus on plastic surgery in the elderly. Little data exists in the plastic surgery literature documenting the safety and efficacy of cosmetic surgery in the elderly. How old is too old? Hence, the reason for our study.

Method: One hundred patients under the age of 65 operated on by a single surgeon in our department were compared with 70 patients over the age of 65 with regard to local, systemic, major and minor complications following facelift surgery.

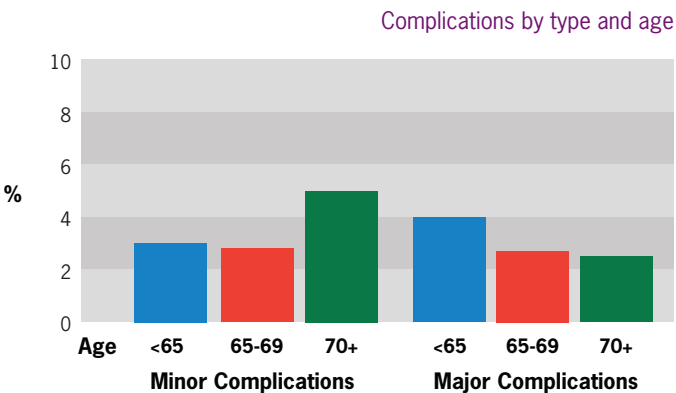


Patients were further subdivided into those less than 65 years of age, 65 to 70, and over 70. Patients less than 65 were compared to those over 65. Patients less than 65 were also compared to those 65 to 70 and over 70 years of age.

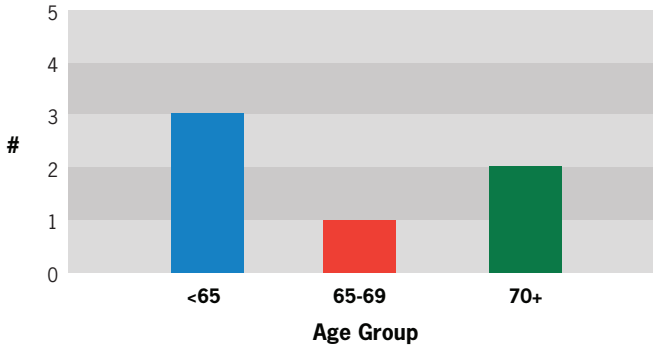




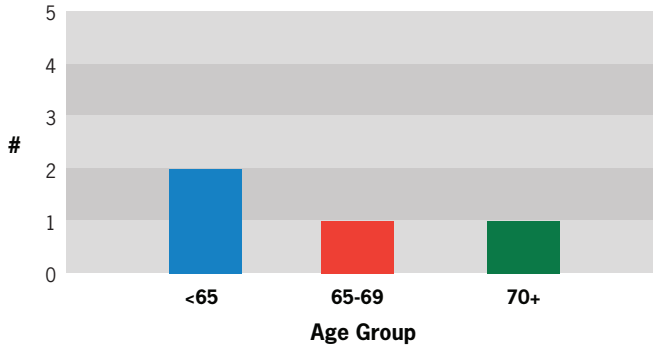
Major complications were defined as those requiring a return to the operating room and/or hospital admission. In addition, prolonged facial analysis defined as facial nerve weakness lasting longer than two weeks was considered a major complication. Minor complications were defined as complications readily treated in the office setting. Local complications were defined as those occurring in the area of the facelift surgical site. Systemic complications were defined as myocardial infarction, major cardiac or pulmonary event or venous thrombosis.

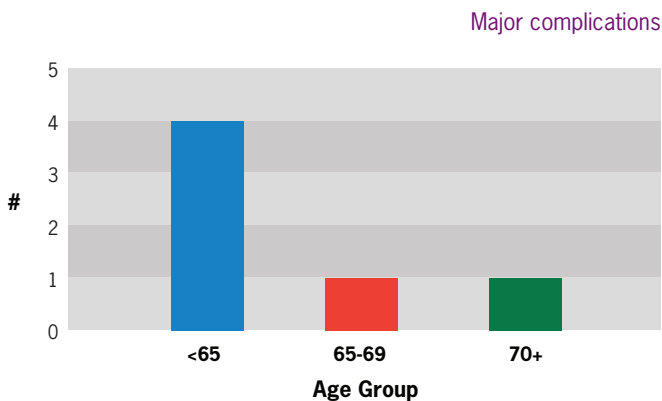
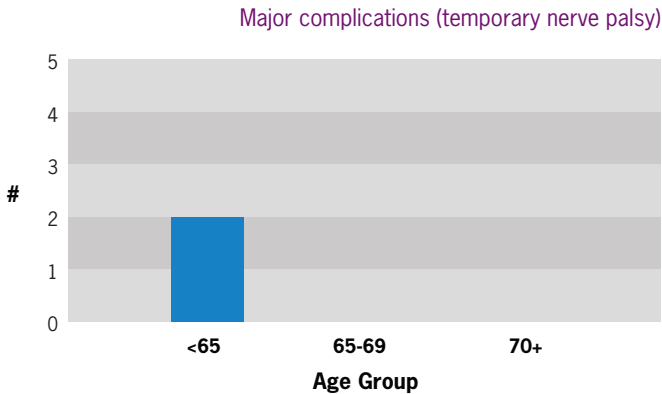


Minor complications (small hematoma)



Major complications (large hematoma)



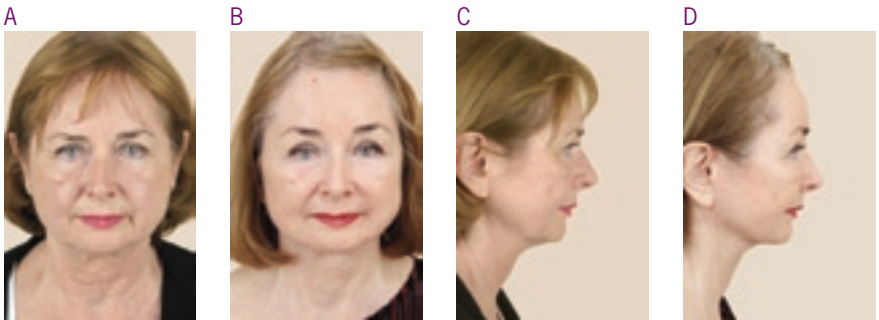


Results: When corrected for disease entities, patients greater than 65 years of age had no statistically significant greater incidence of minor, major, local or systemic complications compared to patients less than 65. When data was further extrapolated to patients less than 65 years of age, patients between 65 and 70 and patients older than 70, no statistically significant differences in the incidence of local, systemic, minor or major complications were noted among subgroups.

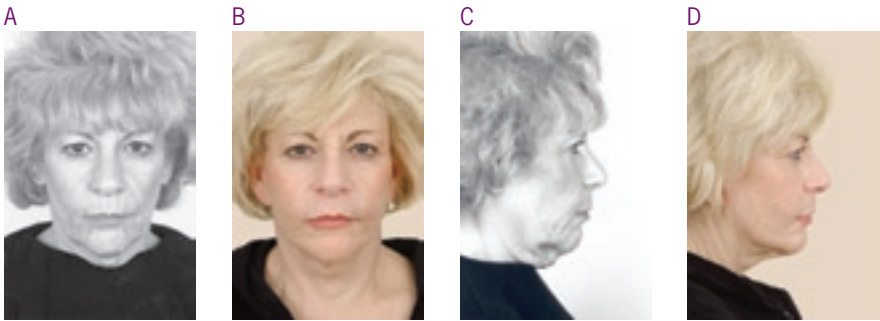




A and C demonstrate a 60-year-old woman with the characteristics of facial aging in the lower face and neck preoperatively. Figures B and D demonstrate correction of the lower face and neck one year postoperatively.



Preoperative and one-year postoperative views of a 72-year-old woman following facelift and brow lift surgery. A. Preoperative front view. B. Postoperative front view. C. Preoperative profile view. D. One year postoperative profile view.



A. Preoperative front view of a 60-year-old woman. B. Postoperative front view six months following facelift surgery. C. Preoperative profile. D. Postoperative profile.

Conclusion: Physiologic rather than chronologic age is the best determinant if a patient should undergo facelift surgery. In the absence of significant systemic disease, the facelift operation can be safely performed in the elderly patient population. The oldest patient in this study was 79 years old. No statistically significant differences occurred in major complications, minor complications, local or systemic complications in patients over 65 years of age when compared to those patients less than 65. When the subgroups of patients 65 to 70 and over 70 were subdivided, again, no statistically significant differences were noted in local or systemic complications.

Alternatives to Facelift Surgery in the Elderly

As cosmetic surgery gains appeal, older patients are seeking cosmetic surgery in greater numbers. While traditional facelift surgery has proven safe and effective in the elderly population, with proper screening for significant medical illnesses, the length and complexity of the operation may discourage some elderly patients from undergoing such a procedure.

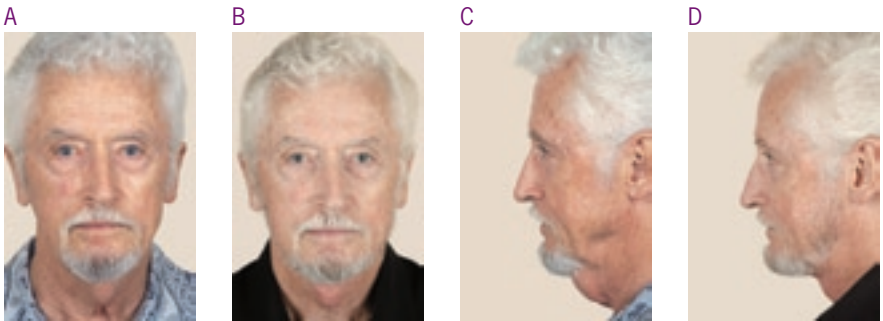
While ancillary, nonsurgical procedures such as botulinum toxin A (Botox), fillers (Restylane, Radiesse, Sculptra, Juvederm) and superficial peels may be effective in younger patients, they are significantly less effective in the elderly when significant skin excess is present.

There are, however, a number of less invasive, less complex alternative cosmetic surgeries that are very effective for those reticent to undergo more extensive procedures.

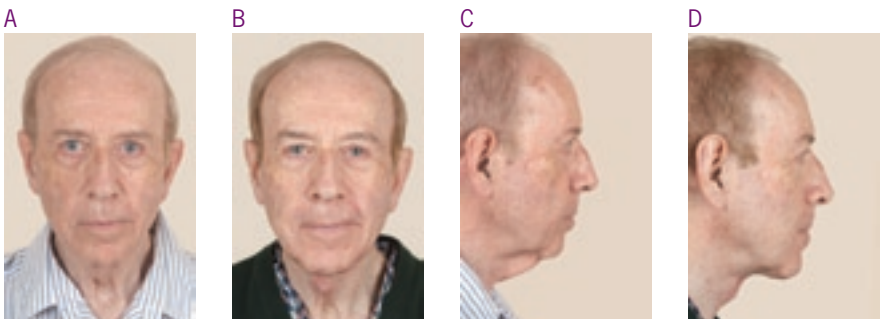


Direct Neck Excision and Z-plasty

Facial skin laxity is greatest in the neck. Direct neck excision and Z-plasty significantly improves the appearance of the patient's profile but has relatively little effect on front-view appearance. The tradeoff for this correction is a zigzag scar in the neck area. This operation is most effective in the elderly male, generally heals well and is effective in correcting neck contour.



A 71-year-old man with marked skin excess in the submental area. A. Preoperative front view. B. One year postoperative frontal view after direct neck skin excision, platysmaplasty and Z-plasty on the skin. C. Preoperative profile. D. One year postoperative profile.



A 71-year-old man with marked skin excess in the submental area. A. Preoperative front view. B. One year postoperative front view following direct excision of neck skin and Z-plasty. C. Preoperative profile. D. One year postoperative profile.

Direct Excision of the Nasolabial Folds

Direct excision of the nasolabial folds and direct excision of the jowl area is very effective in correcting the medial laxity of facial aging seen in the elderly population. In fact, this procedure, while simple, straightforward and with minimal downtime, is much more effective in correcting facial laxity in the area around the nose, mouth and lips in this patient population than the use of fillers.



- A. 78-year-old man who had deep nasolabial folds preoperatively. This patient is not a good candidate for fillers.
- B. Direct excision of the nasolabial folds yields significant improvement with minimal scarring.

This procedure can also be combined with a facelift, performed as a second operation three months following facelift surgery. This technique is especially effective in both the elderly and in patients who have had significant weight loss.





A. Preoperative frontal view. B. One year postoperative view following direct excision of the nasolabial folds in combination with a facelift.

Corner of the Lip Lift

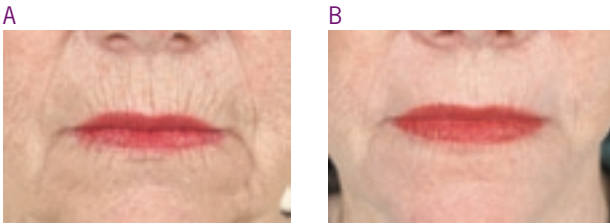
The down-turned corners of the mouth are relatively difficult to correct with facelift surgery alone. This operation can be done alone or as noted above following facelift operation with very beneficial effects.



A. Preoperative front view. B. Two months postoperative view following corner of the lip lift.

Phenol Croton Oil Peels

Deep chemical peeling techniques and CO₂ laser resurfacing can dramatically alter the perioral (mouth) area. This procedure can be done under local anesthesia or local anesthesia with sedation. Peeling does not require discontinuation of any medications including aspirin, non-steroidals, analgesics or vitamins. The peel in the mouth area can be performed as an isolated procedure or in concert with direct skin excisions as demonstrated in figures A and B.



A. Vertical wrinkles of the upper lip are caused by attachments between orbicularis muscle and dermis. B. These can be effectively treated by CO₂ laser resurfacing.

Anterior Lipectomy and Plastysmaplasty: An Alternative to Facelift Surgery

Not all patients with facial aging are prepared to undergo a facelift operation. Indeed, there are subsets of patients with facial aging who do not require facelift surgery. This group of patients can obtain significant improvement with a lesser procedure. These patients, however, need to be carefully screened.

Our plastic surgery department, along with other plastic surgeons in the country, developed an operation which can lead to significant improvement in neck contour through an incision made only under the chin. This procedure was recently described in the plastic surgery literature (Zins JE, Fardo DJ. Anterior-Only Approach to Neck Rejuvenation: An Alternative to Facelift Surgery. *Plast Reconstr Surg* 2005;15:1761.)

Patients undergoing this lesser procedure will obtain improvement predominantly in the profile view. This operation, therefore, is most effective for patients who want improvement only in the neckline and who are not concerned about the mid-face. This report outlines long-term results following this operation (i.e. greater than one year). In order to objectify results, patients were categorized according to the degree of neck deformity both before and after surgery. Grade I patients have ideal neckline; Grade II patients have mild aging in the neck area; Grade III, moderate aging; and Grade IV, severe aging in the neck region. All patients were graded both before and after surgery and results analyzed. Virtually all patients improved one to two grades following surgery and maintained this correction.

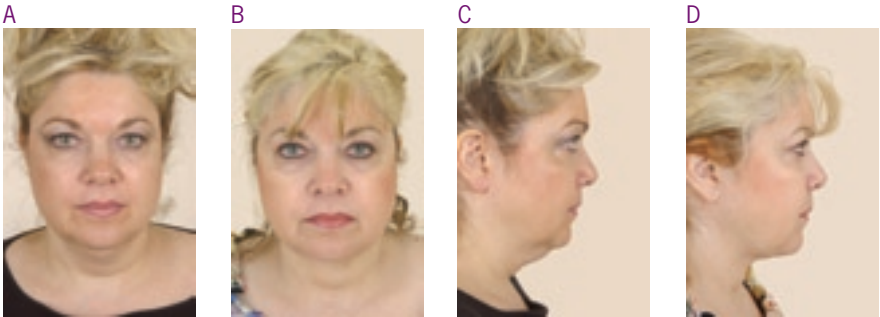




A. Preoperative front view, mild (Grade II neck deformity). B. Postoperative front view five months following anterior lipectomy and platysmaplasty. C. Preoperative profile view. D. Postoperative profile view.



A. Preoperative front view, mild (Grade II neck deformity). B. Postoperative front view three years following anterior lipectomy and platysmaplasty. C. Preoperative profile view. D. Postoperative profile view.

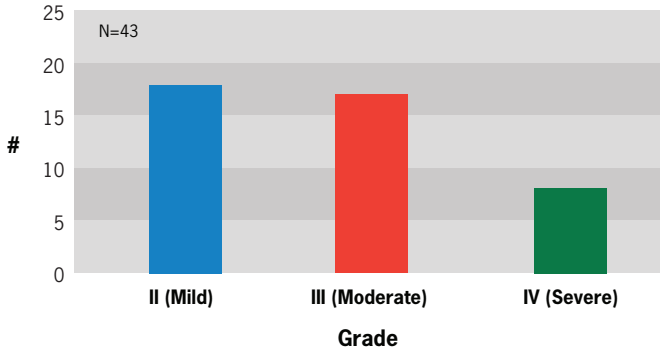


A. Preoperative front view, moderate (Grade III neck deformity). B. Postoperative front view nine months following anterior lipectomy and platysmaplasty. C. Preoperative profile view. D. Postoperative profile view.

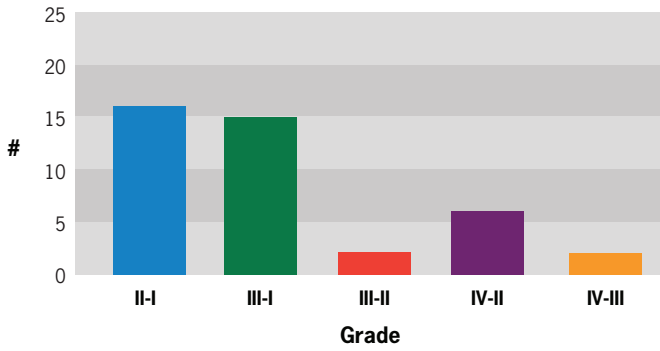


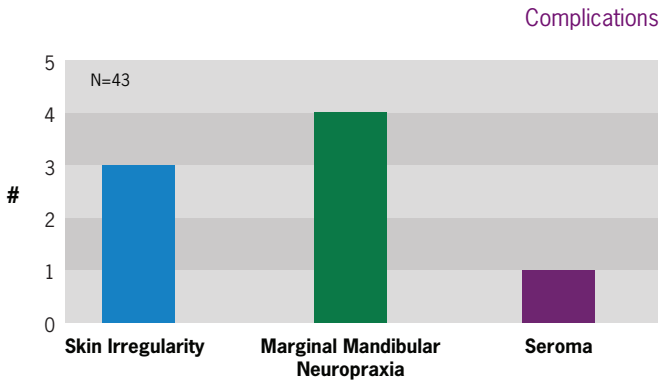
A. Preoperative front view, moderate (Grade III neck deformity). B. Postoperative front view one year following anterior lipectomy and platysmaplasty. C. Preoperative profile view. D. Postoperative profile view.

1997-2006



Results





The initial description of this procedure advocated it for the patient with mild to moderate neck deformities (Grade II-III); it was not recommended for patients with significant skin laxity (Grade IV). More recently, however, this operation has been extended with postoperative improvement. Still, patients with more significant deformity, while improved, do not achieve ideal results.

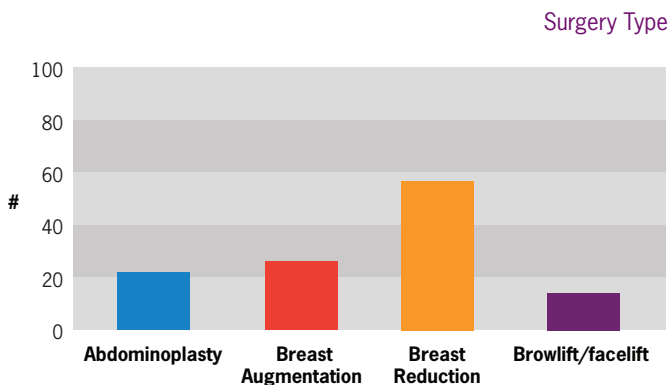
Pain Control Using a Self-Administered Infusion Catheter (On-Q Pain Pump)

Post-surgical pain, nausea and vomiting are the most feared, adverse sequelae from the patient's viewpoint. The mainstay and traditional means of postoperative pain control involves the use of narcotics or non-narcotic analgesics. Narcotics have a host of adverse side effects including: nausea, vomiting, constipation and depression. Further, they can prolong recovery room and even hospital stay. The Department of Plastic Surgery investigated the use of a self-administering, continuous infusion catheter placed at the time of surgery. This continuous infusion catheter supplies a long-acting, local anesthetic placed in the incision site at the time of surgery. It is easily removed several days after surgery by the patient at home.

Criteria used to evaluate pain control in this prospective study include:

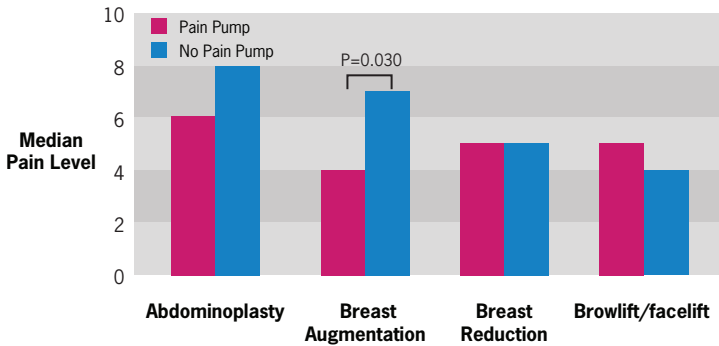
1. Pain level (1-10)
2. The amount of narcotics required in the recovery room and at the time of discharge from the recovery room.
3. Nausea and vomiting (1-10)

Patients undergoing a variety of cosmetic surgery operations including abdominoplasty, breast augmentation, breast reduction and brow lift surgery, were evaluated prospectively.

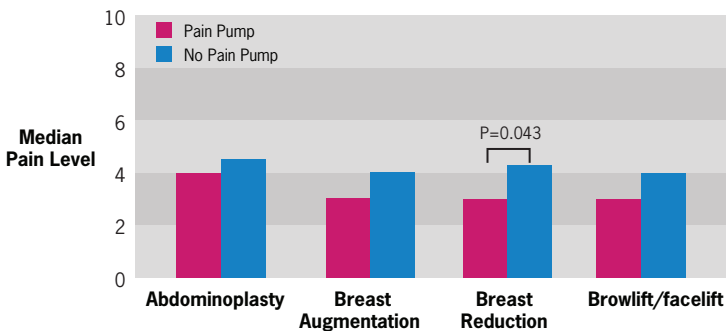


Prospectively studied patients undergoing abdominoplasty and breast augmentation ($p=0.030$) had less pain entering the recovery room when the pain pump was used. Patients undergoing breast reduction had less pain leaving the recovery room when the pain pump was used compared to patients who did not use the pain pump ($p=0.043$). Data with regard to pain, nausea and vomiting at 24 hours and seven days postoperatively are currently being analyzed and were not available at the time of publication.

Pain Level Entering PACU



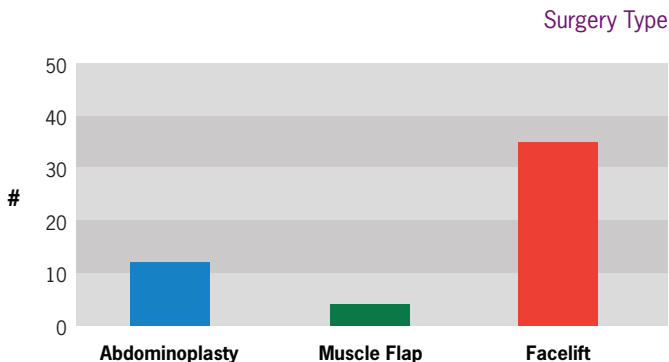
Pain Level Leaving PACU

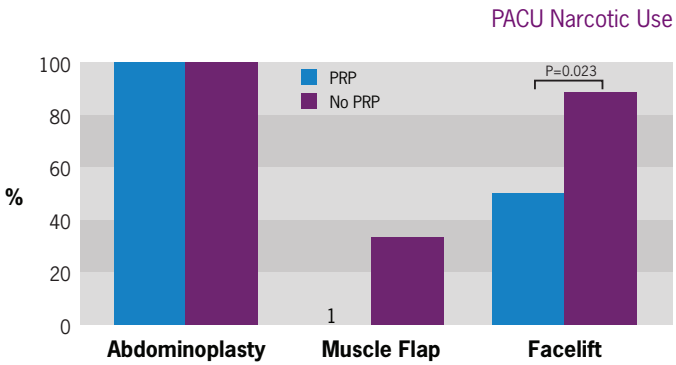
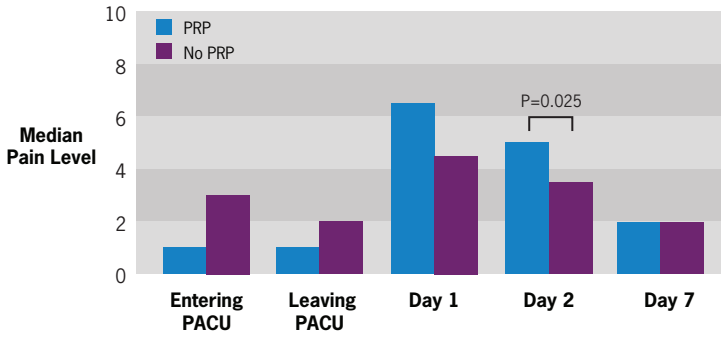


Conclusion: Self-administering continuous infusion catheters provide continuous administration of local anesthesia in the early postoperative setting. The catheter is easily removed at home. Early data suggests significant pain reduction in aesthetic and reconstructive breast surgery and an improvement in pain with abdominoplasty surgery, although data is preliminary. It is yet to be determined if continuous infusion of local anesthesia via the pain pump can reduce recovery room stay or convert inpatient operations to outpatient operations.

Platelet Rich Plasma (PRP)

Means of enhancing wound healing through the manipulation of products present in the patient's own blood is an area of clinical investigation in the Department of Plastic Surgery. Using autologous (patient's own) concentrated platelets (platelet-rich plasma) is a promising area of investigation. This is being used clinically in facelift patients and experimentally in a small animal model in an attempt to maximize the "take" or volume maintenance following human fat transplantation. Platelet-rich plasma is currently being used in facelift, breast reduction and abdominoplasty patients as well as patients undergoing muscle flaps. This data will be analyzed once the numbers of patients enrolled in this study are determined.





1 - No patients had narcotic information recorded



Advances in Hair Transplantation

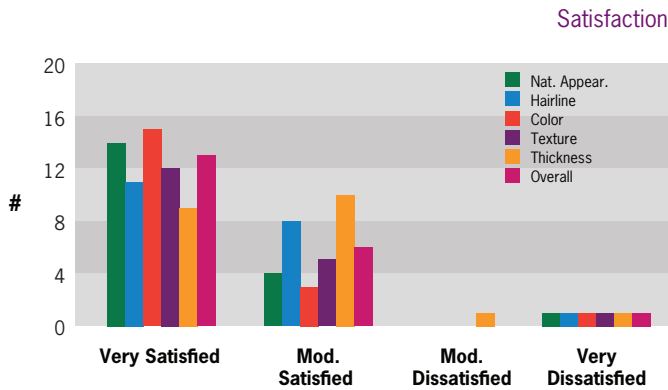
The Omnigraft Hair Transplantation Apparatus

The Omnigraft machine is an automated means of processing micro minigrafts for hair transplantation and dramatically reduces the time required for processing micro minigrafts. This allows large numbers of hair transplants to be readily performed in three to four hours. It also significantly reduces the required personnel for these procedures.

Omnigraft Machine

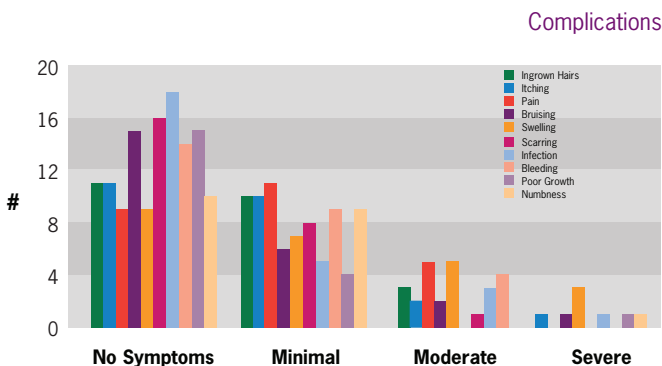


In January 2006, a survey was sent to 88 patients who had undergone hair transplantation. The parameters studied included natural appearance, hairline, texture, thickness, color and overall satisfaction with the procedure.

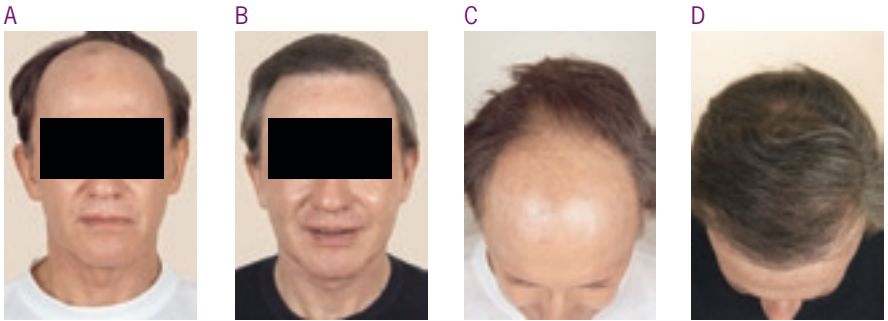


Greater than 90% of patients were very satisfied with the natural appearance of their hair transplantation and 78% were very satisfied with the hairline.

Complications occurred in a minimum number of patients and were graded by patients as minimum to moderate in a large majority of cases.



Before and after photographs are documented below.



A. Preoperative hair transplantation, front view. B. Postoperative front view status post multiple hair transplantation procedures. C. Preoperative hair transplantation, top view. D. Postoperative status post multiple hair transplantation procedures, top view.

Conclusion: Hair transplantation using the Omnigraft apparatus is safe, effective and significantly reduces time for the procedure and personnel. A large majority of patients were very satisfied with their hair transplantation procedures.

Laser Hair Removal

Laser-assisted hair removal is considered the most effective method of long-term hair reduction. Choosing the most suitable laser wavelength and parameters (fluence, pulse duration and spot size) for the patient's skin type is critical for optimal hair reduction. When the procedure is carried out after careful selection of patients and laser system, it should result in long-term hair reduction; however, the reappearance of hair tends to occur at variable rates.

Our purpose was to evaluate patient satisfaction with the procedure using a diode-laser system. A self-administered survey was mailed to 220 patients who underwent treatment between 2000 and 2004. These questions addressed the area treated, number of treatments received, post-procedure hair density and overall satisfaction.

Of the 220 surveys sent out, 114 (52%) were completed and returned. The majority of patients (66%) indicated having "white skin" while 12% had "dark skin." The top four most commonly treated areas were the face 63%, bikini area 23%, underarms 16%, and legs 11%.

We believe the success of laser hair removal should be established not only on the basis of hair counts and histology, but also on patient satisfaction. This report presents laser hair removal outcomes based on patient satisfaction.

Our study shows relatively good overall satisfaction with the hair reduction procedure. The majority of patients (80%) were very satisfied or somewhat satisfied and 38% were very satisfied with their results. The reported reduction in hair density correlated with the degree of satisfaction with 80% of patients reporting 50%-75% hair loss. These results are comparable with the previous literature. Our study, however, includes patients who underwent laser hair removal over a four-year span (mean = two years); therefore, our study differs from previous studies because both long-term follow-up and patient satisfaction rates were documented. Further, we showed minimal reported long-term side effects reflecting the safety of the diode laser device. The number of treatments did not seem to affect overall



outcomes. Although the literature clearly supports multiple versus single treatment, the recommended number of treatments is yet to be determined.

Conclusion: With proper preoperative evaluation and patient counseling, long-term patient satisfaction rates with the LightSheer diode laser should be high, reaching 80% in our review. To reach this satisfaction level, however, five to six treatments over approximately 13 to 18 months were required. Only slightly more than 50% of patients completed treatments, suggesting prolonged treatment intervals and the need for multiple treatments were deterrents to therapy completion. Long-term complications, however, were few.

Amount of achieved hair reduction,
hair density, color and side effects

	Yes (%)	No (%)
Amount of Hair Loss		
25%	23.8	18.0
50%	42.9	37.2
75%	28.6	43.6
100%	4.8	1.3
Hair Density Results		
Less Dense	59.1	60.3
Less Coarse	36.4	39.7
Lighter Color	13.6	23.1
No Change	18.2	7.7
Side Effects		
Hyperpigmentation	9.1	4.9
Hypopigmentation	4.6	2.5
Scarring	0.0	1.2
None	86.4	92.6



	Completed Recommended Treatment (%)	Did Not Complete Recommended Treatment (%)
Amount of Hair Loss		
25%	16.4	28.6
50%	36.4	42.9
75%	45.5	25.7
100%	1.8	2.0
Hair Density Results		
Less Dense	60.7	65.7
Less Coarse	41.1	31.4
Lighter Color	21.4	17.1
No Change	8.9	14.3
Side Effects		
Hyperpigmentation	5.3	11.1
Hypopigmentation	3.5	2.8
Scarring	1.8	0.0
None	93.0	83.3



Satisfaction Survey

	Completed Recommended Treatments (%)	Did Not Complete Recommended Treatments (%)
How informative was the initial consultation?		
Not informative	3.3	0.0
Somewhat informative	18.3	18.9
Very informative	78.3	81.1
Willingness to return for additional hair removal		
Not likely	11.9	10.8
Somewhat likely	20.3	21.6
Very likely	67.8	67.6
Recommend hair removal to a friend or family member		
Not likely	16.7	13.5
Somewhat likely	16.7	13.5
Very likely	66.7	73.0
Satisfied with laser hair removal procedure		
Very dissatisfied	11.7	8.1
Somewhat dissatisfied	13.3	10.8
Somewhat satisfied	43.3	48.7
Very satisfied	31.7	32.4



Reconstructive Surgery

Microsurgical Breast Reconstruction: DIEP Flap

Deep inferior epigastric perforator (DIEP) flaps offer significant potential advantages over traditional means of breast reconstruction. This procedure requires significant surgical expertise in microsurgery and a well-trained team.

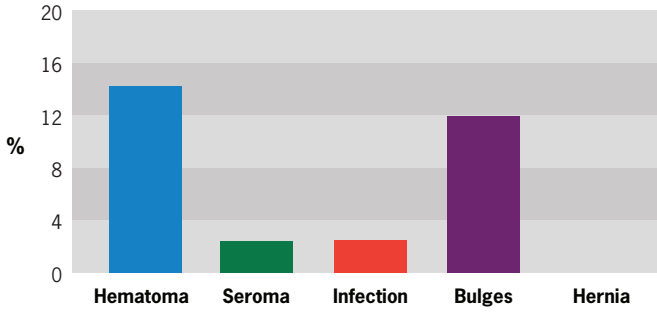
One potential benefit of this procedure is reduced morbidity to the abdominal wall. When a DIEP flap is harvested, skin and underlying fatty tissues from the abdomen are removed, but the muscle and abdominal wall fascia are preserved and left in place. The DIEP flap relies on blood vessels that travel through (perforating) the rectus abdominus muscle to supply the blood to the overlying abdominal skin. These vessels are the deep inferior epigastric artery and the deep inferior epigastric vein.

The TRAM flap requires sacrifice of at least one muscle, occasionally two major muscles, of the abdominal wall to perform the breast reconstruction. Due to this, a reduced risk of abdominal wall weakness and hernia are associated with the use of a DIEP flap. Patients also report less discomfort following DIEP surgery compared to a TRAM flap. With reduced pain and the fact that the muscle wall remains intact, patients are more apt to return to their daily routines more quickly. In addition, they are more likely able to participate in vigorous physical activity.

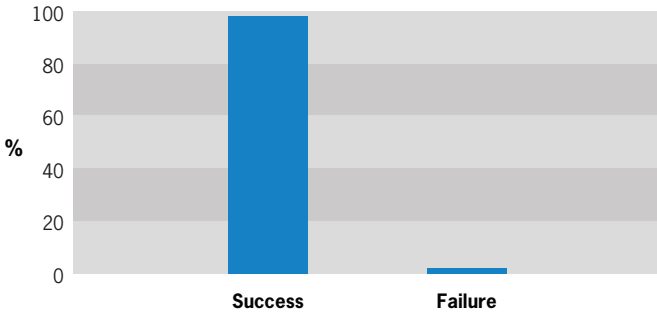
As women become more and more educated regarding breast reconstruction, the DIEP flap is becoming increasingly popular and is requested by a larger number of females requiring reconstruction for breast cancer.



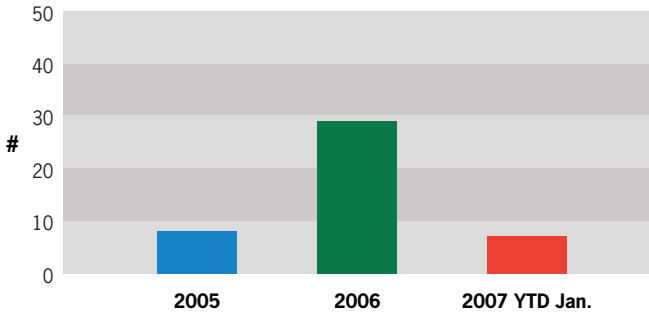
Complications after DIEP Surgery

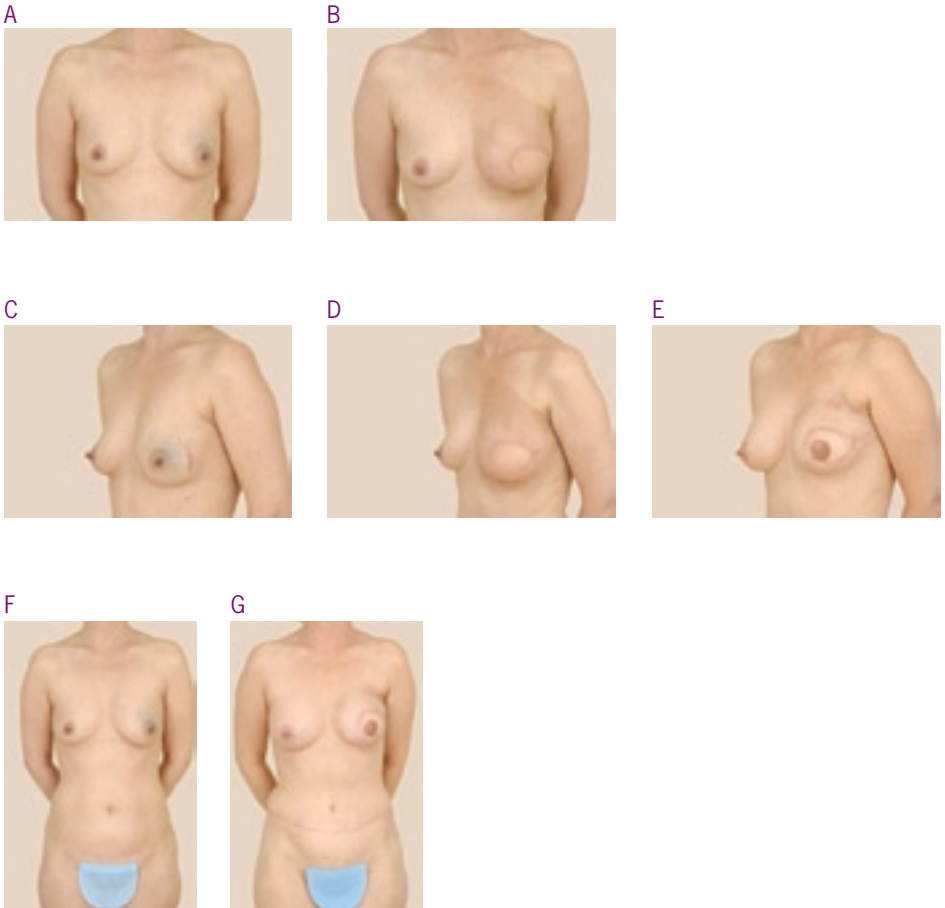


Success/Failure Rates for DIEP

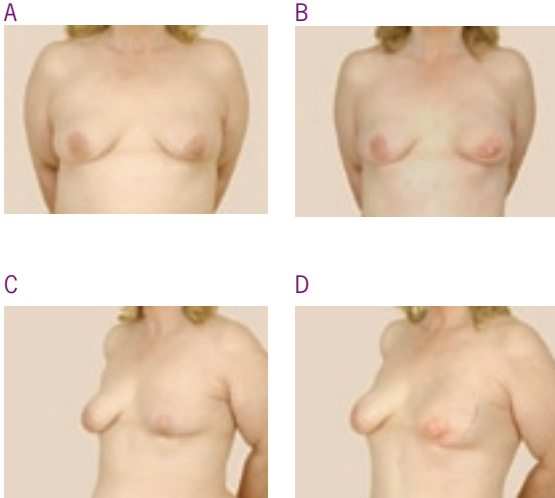


DIEP Flap Breast Reconstruction Patients





A. Preoperative DIEP flap left breast, front view. B. Postoperative DIEP flap and radiation, left breast front view. C. Preoperative DIEP flap left, breast side view. D. Postoperative DIEP flap and radiation, left breast side view. E. Postoperative DIEP flap, radiation therapy and nipple reconstruction, left breast side view. F. Preoperative DIEP flap front view, torso. G. Postoperative DIEP flap front view, torso.



A. Preoperative DIEP flap (post lumpectomy) left breast, front torso view. B. Postoperative DIEP flap left breast, front view. C. Preoperative DIEP flap (post lumpectomy) left breast, side torso view. D. Postoperative DIEP flap left breast, side view.

A



B



A. Preoperative DIEP flap, front view. B. Postoperative DIEP flap right breast, front view.

A



B



A. Preoperative DIEP flap, front view. B. Postoperative DIEP flap left breast and reduction of contralateral breast, front view.

Breast Reduction

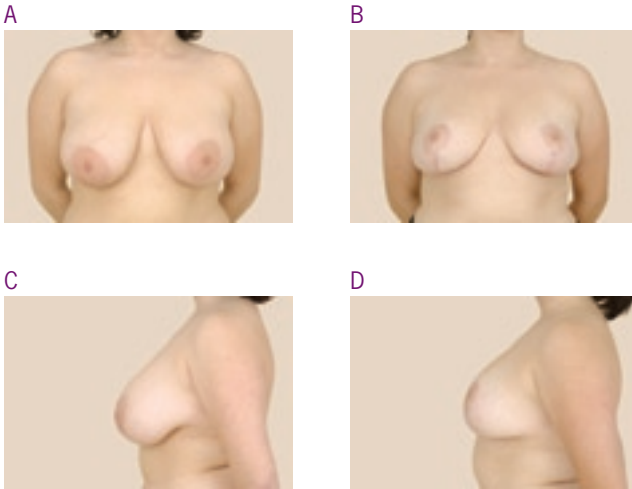
Breast reduction is one of the most common plastic surgery procedures performed in the United States. Patient satisfaction is over 90% after surgery. Many techniques for breast reduction are described and promoted as the “ideal” technique. One technique is preoperative infiltration of tumescent solution consisting of lidocaine and epinephrine. In the literature, however, there is no large prospective trial that specifically evaluates this technique. We hypothesize that this solution reduces blood loss, operative time, and postoperative pain. We also hypothesize tissue weight is similar with and without this solution.

A retrospective study was performed comparing a cohort of 50 patients undergoing a traditional breast reduction without tumescent infiltration and 50 patients receiving tumescent infiltration. Patient’s intraoperative blood loss, specimen weight, total operative time, and postoperative pain were recorded.

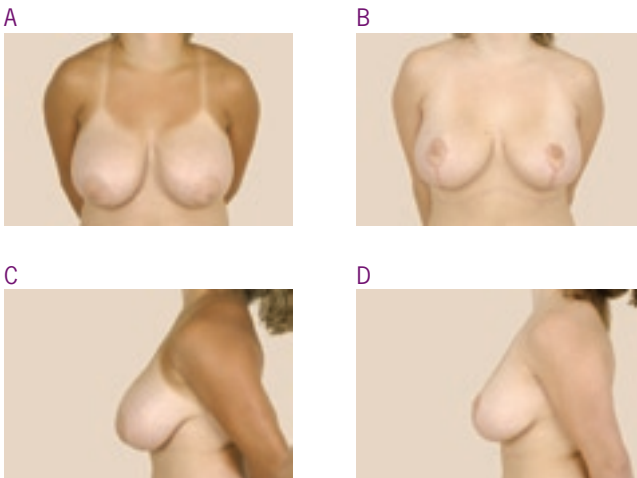
Patients who had breast reduction with the tumescent technique had significantly shorter operative times, reduced intraoperative blood loss and reduced postoperative pain compared to the traditional technique. The use of tumescence did not affect the weight of resected tissue specimen. There was no evidence that drains were necessary postoperatively.

This procedure offers patients less operative time and, thus, less anesthetic time. It also reduces intraoperative blood loss and postoperative pain.





A. Preoperative traditional breast reduction, front view. B. Postoperative traditional breast reduction, front view. C. Preoperative traditional breast reduction, profile view. D. Postoperative traditional breast reduction, profile view.



A. Preoperative tumescent breast reduction, front view. B. Postoperative tumescent breast reduction, front view. C. Preoperative tumescent breast reduction, profile view. D. Postoperative tumescent breast reduction, profile view.

Hand Surgery: Complex Regional Pain Syndrome

A retrospective review of 91 patients surgically treated with peripheral nerve stimulation from 1991 to 2003 was reviewed with regard to pain relief.

Complex regional pain syndrome is a relatively new term which encompasses a wide variety of previously described painful syndromes, including reflex sympathetic dystrophy and causalgia. Complex regional pain syndrome (CRPS) is now classified as either Type I (reflex sympathetic dystrophy) or Type II (causalgia). Descriptive terms of the two types of regional pain syndrome are illustrated.

Complex Regional Pain Syndrome

Type I (Reflex Sympathetic Dystrophy)

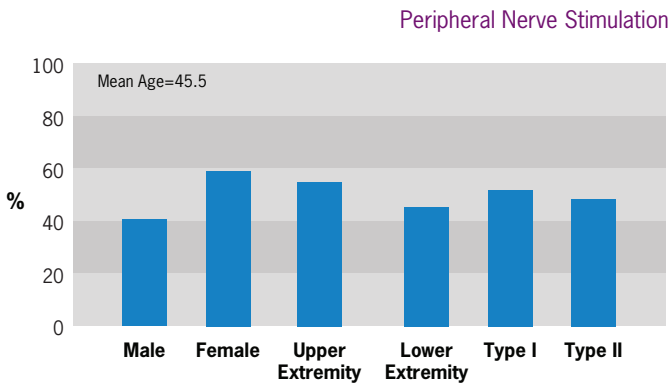
Type II (Causalgia)

1. Type I is a syndrome that develops after an initiating noxious event.
Type II is a syndrome that develops after a nerve injury.
2. Spontaneous pain or allodynia/hyperalgesia occur, not limited to the territory of a single peripheral nerve, and is disproportionate to the inciting event.
3. There is or has been evidence of edema, abnormality of skin blood flow or abnormal sudomotor activity in the region of the pain since the inciting event.
4. This diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction.

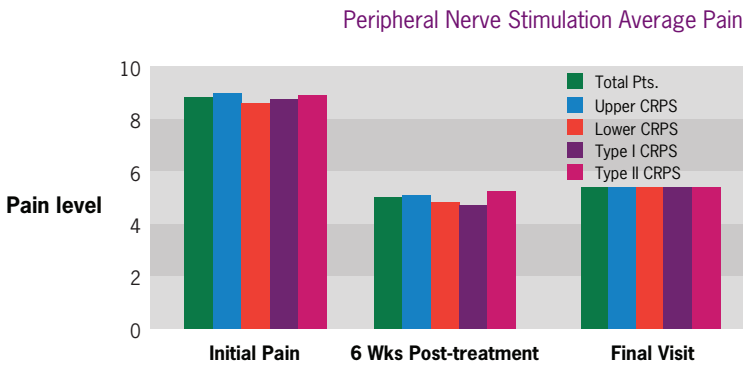


These complex regional pain syndromes are notoriously difficult to treat and often lead to chronic pain and disability. Initially described in the upper extremity, it is now known that it can affect any area of the body, including the upper and lower extremities, the groin, breast and other body parts. By definition, these syndromes need to be differentiated by ruling out all other organic causes of pain such as nerve entrapment, neuroma and other specific anatomic disorders. Pain is characterized by being out of proportion to the inciting incident.

The table delineates gender variation, location of the pain syndrome and the pain syndrome type.



Statistically significant pain relief was obtained with peripheral nerve stimulation both at six weeks and at the time of the final patient visit. Mean pain level pretreatment was 8.8. Mean pain level six weeks post-treatment was 4.8 ($p < 0.001$). At the final visit (average 31.3 months), mean pain level was 5.2 ($p < 0.001$) (pain level range 0-10).

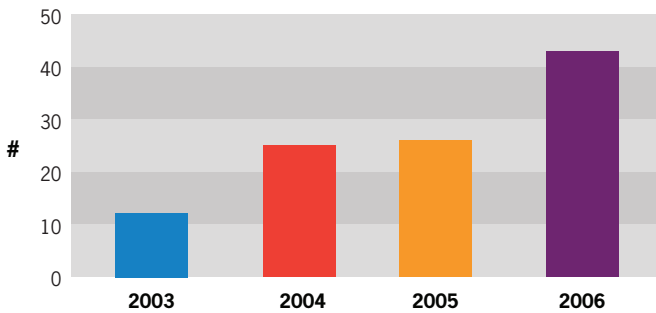


Conclusion: Peripheral nerve stimulation is effective in reducing pain in a subset of patients with complex regional pain syndrome.

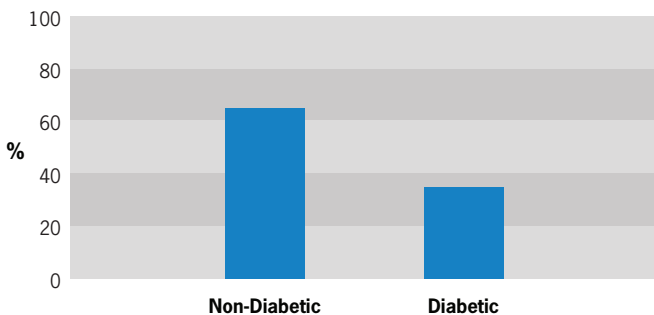


Surgical Treatment for Peripheral Neuropathy

Surgical decompression of peripheral nerves has been performed in the Department of Plastic Surgery for patients with lower extremity peripheral neuropathy since 2003. Surgery was performed in patients suffering from diabetic and non-diabetic neuropathy with evidence of underlying nerve compression. Treated nerves included the common peroneal nerve, deep peroneal nerve, superficial peroneal and posterior tibial nerves. Clinical evaluation and preoperative Quantitative Sensory Testing were used to identify patients who would benefit from surgery.

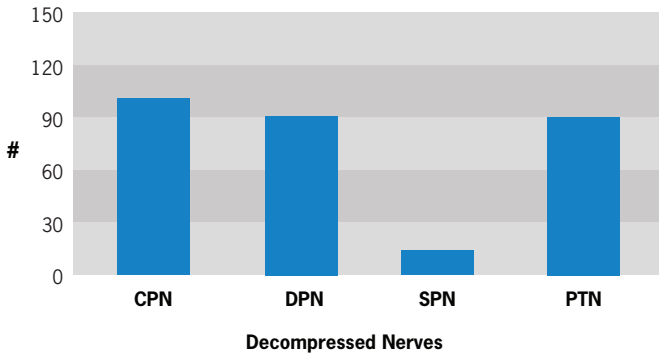


Number of patients treated by surgical decompression of peripheral nerves between 2003 and 2006.

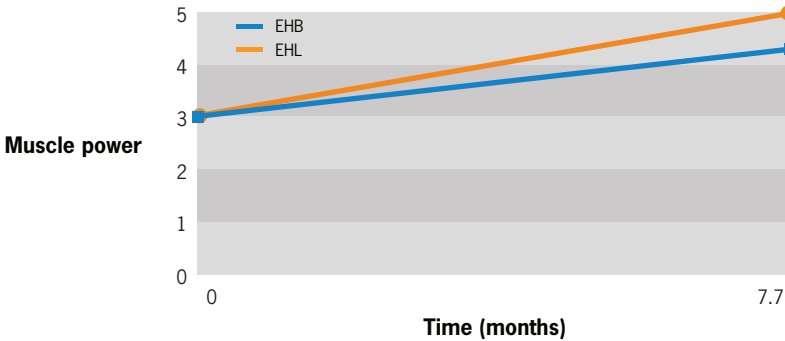


The non-diabetic group included patients with lower extremity neuropathy of undetermined etiology and those following trauma, including nerve traction injury.



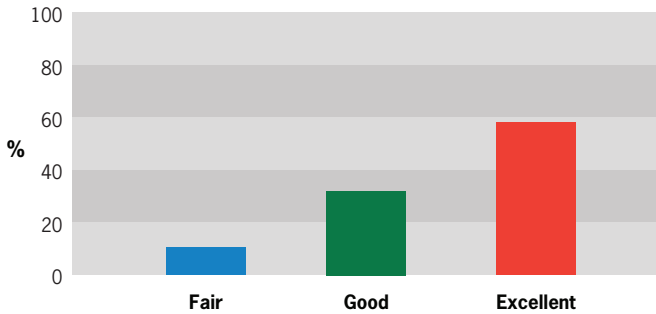


Between 2003 and 2006, a total of 287 peripheral nerves of lower extremities were surgically decompressed in 106 patients, including common peroneal nerve (CPN), deep peroneal nerve (DPN), superficial peroneal nerve (SPN), and posterior tibial nerve (PTN).



Results of decompression showing improvement in the muscle power of the extensor hallucis longus (EHL) and extensor hallucis brevis (EHB) muscles, after surgical decompression of the common peroneal nerve at the neck of the fibula.





Clinical outcome was satisfactory in 90% of patients over a mean duration of 7.7 months. Clinical outcome was classified according to the level of postoperative pain, continuous use of neuropathic and narcotic pain medications, return of sensation, improvement in walking distance and return to work. Three patients developed delayed healing over the tarsal tunnel surgical site lasting more than six weeks.



Endoscopically-Assisted Inferior-Turbinate Reduction in Functional Rhinoplasty

Surgical treatment of inferior turbinate hypertrophy has evolved over time. Most recently, endoscopically-assisted inferior-turbinate reduction with powered instrumentation has become an attractive alternative to more traditional approaches for the treatment of nasal obstruction due to hypertrophy of the inferior turbinate.

The advantages of this technique are:

1. Precise anatomic visualization of the inferior turbinate
2. Precise reduction of the inferior turbinate
3. Avoidance of thermal injury to the inferior turbinate mucosa
4. Maintenance of the functional aspect of the inferior turbinate and its mucosa
5. Ease of use
6. Easier postoperative recovery

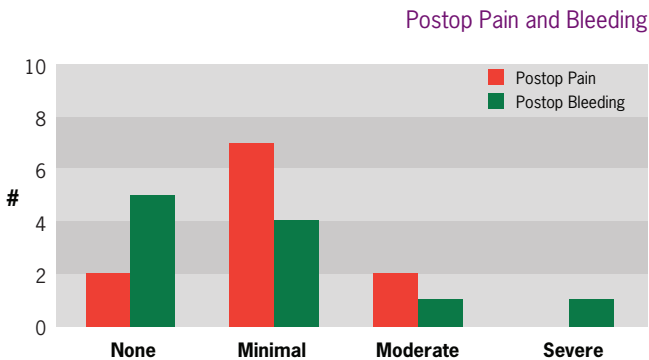
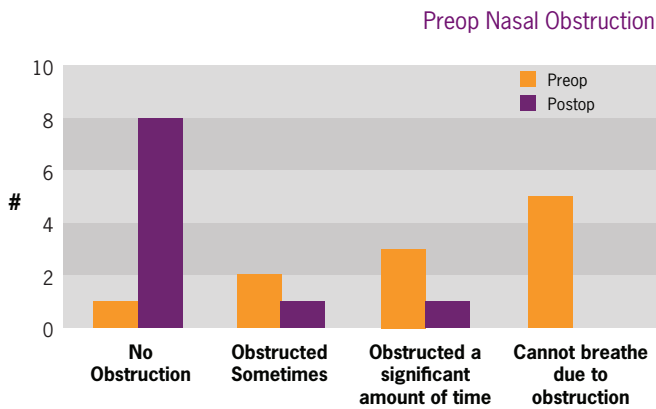
This approach involves a thorough preoperative examination to determine any functional nasal obstruction which can include septal deviation with concomitant inferior turbinate hypertrophy. Often, functional nasal surgery is combined with cosmetic external alteration of the nasal shape and size.

Operative steps:

1. Decongestion of the nose with nasal sprays and pledgets
2. Thorough endoscopic intraoperative examination of the pathology
3. Incision in the mucosa on the anterior medial aspect of the inferior turbinate
4. Submucosal dissection and elevation of the mucosa of the inferior turbinate bone
5. Introduction of an inferior turbinate instrument/blade that enables resection and evacuation of the stroma and submucosa and bone



This technique has been used in our department since early 2006. To date, 15 patients underwent this procedure. A retrospective patient evaluation was done to determine the efficacy of this procedure and to study the results obtained thus far with this technique. The study method included a patient questionnaire and periodic postoperative nasal examinations.



The results demonstrate no complications with the procedure. A majority of patients (81%) reported no further nasal obstruction. All patients (100%) reported they would recommend this procedure.



To further study this surgical technique in the management of inferior turbinate hypertrophy, we plan to do postoperative objective analysis. Such analysis will include a rhinometer to measure preoperative air flow and postoperative air flow measurements. In addition, a postoperative visual analog score will be given after endoscopic nasal examinations. Nasal endoscopy is also planned to further improve our teaching methods to residents and fellows.

The following figures illustrate the instruments used during the procedure, preoperative photos and immediate postoperative photos.



The hummer device reduces submucosa of the inferior turbinate.



The working tip of the device.



Intranasal endoscopic view of enlarged inferior turbinate.



Same intranasal view after treatment of turbinate.

Pediatrics

Tissue Adhesive for Primary Repair of Congenital Cleft Lip

Reconstruction of cleft lips offers challenges to the reconstructive surgeon. The variable long-term cosmetic and functional outcomes demand a meticulous and flexible technique. Innovations and refinement continue to yield significant gains in both cosmetic outcome and increased function of the lip and nose. The Department of Plastic Surgery recently utilized tissue adhesives as a viable alternative to traditional suturing techniques without compromising wound healing of the cleft lip repair.

Octyl-2-cyanoacrylate (Dermabond®) was utilized in a wide variety of clinical settings for skin adhesion in wound closure. These adhesive properties suggest octyl-2-cyanoacrylate can be an ideal tissue adhesive for skin closure and cleft lip repair. The Cleveland Clinic study was undertaken to perform a comparison of cosmetic outcomes for octyl-2-cyanoacrylate skin glue in traditional suturing and skin closure in patients undergoing congenital cleft lip repair.

Conclusions of this study identified octyl-2-cyanoacrylate offered significant advantages over previous tissue adhesive formulations. It is easy to apply, technically forms a barrier to wound contamination and offers good bonding strength, low tissue reactivity and does not require any suture removal or other removal in the clinical office postoperatively. Most importantly, as demonstrated in our clinical findings, octyl-2-cyanoacrylate skin glue offers a significant equivalent cosmetic outcome as the traditional suture closure. The following photographs illustrate the cleft lip closure utilizing octyl-2-cyanoacrylate skin glue showing desirable results.



Preoperative view of left complete cleft lip.



Postoperative view of patient following cleft lip repair and Dermabond® treatment.

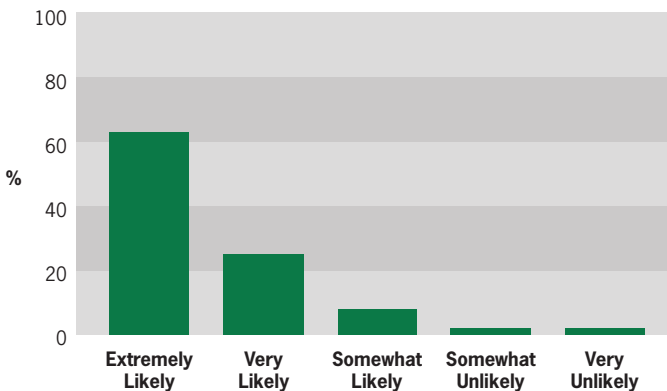
Patient Experience |

We ask our patients about their experiences and satisfaction with the services provided by our staff. Although our patients are already indicating we provide excellent care, we are committed to continuous improvement.

Outpatient
Overall Rating of Care 2006



Outpatient
Would Recommend Provider 2006



Outpatient Surgery
Overall Rating of Care 2006



Innovations |

Face Transplantation

Our face transplant project, led by Dr. Maria Siemionow, began in our plastic surgery laboratory. A variety of transplants were performed on small animals. These included total hind limb transplantation and, ultimately, transplantation of the skin and soft tissue of the face from one unrelated animal to another. A variety of immunosuppressive techniques were also developed in the laboratory.

With improvements in immunotherapy and surgical transplantation techniques developed in the laboratory, cadaver dissection was the second phase of this project. A large number of cadaver dissections were used to prove the feasibility of the technique which included vascular injections with barium and similar materials.

With a two-year laboratory and cadaver dissection behind us, we are approaching the time when the team will feel ready and thoroughly trained for this highly controversial transplant to become a reality.

Calcium Phosphate Cements and Bone Substitutes

In 2006, the Department of Plastic Surgery, in collaboration with Synthes Maxillofacial, completed a large animal study investigating long-term results (one year), the histology and the biomechanical evaluation of the use of Norian and Norian Fast-Set Putty (Synthes Maxillofacial) as an alternative to bone grafts in a full-thickness skull defect. These bone substitutes were compared to autogenous (the animal's own) bone graft that was grafted to the opposite side of the skull. This long-term biomechanical analysis is the first of its kind in the surgical literature and has been accepted for publication in the *Journal of Plastic and Reconstructive Surgery*.

Ongoing cadaver dissections and biomechanical tests will proceed in 2007, again in concert with Synthes Maxillofacial.



Oncoplasty (Reconstruction of Partial Mastectomy Defect)

In concert with the Department of General Surgery, the Department of Plastic Surgery established an ongoing protocol for multidisciplinary treatment of breast defects following conservative resections for breast cancer (partial mastectomy defects). These procedures are done at the time of the excision of the breast tumor when the general surgeon feels a more complex reconstruction would be advisable to minimize deformity resulting from partial mastectomy resection.

At times, this may merely be a rearrangement of local tissues. At other times, muscle tissue may be used, or a reduction of the opposite breast is performed at the time of the partial mastectomy. This may also reduce the likelihood of recurrent breast disease, since the general surgeon is free to remove considerably more tissue when necessary, given that the plastic surgeon is available to help with the reconstruction.

Alleviating Pain in Postoperative Patients

Ongoing protocols are in place in a variety of aesthetic surgery procedures, such as brow lift, abdominoplasty, facelift, breast augmentation and breast reduction surgeries, to minimize postoperative pain, nausea and vomiting using a self-administering continuous-infusion catheter placed at the time of surgery. Through a continuous-infusion catheter, a long-acting local anesthetic is used to minimize postoperative pain. While the data is early and patients continue to be enrolled, improvement in pain has been seen in several subsets.



New Methods in Breast Reconstruction

In 2006, the Department of Plastic Surgery significantly increased its microsurgical expertise by recruiting two additional microsurgeons to the team. The department is rapidly increasing the numbers of microsurgical reconstructions for breast cancer using the DIEP flap.

The theoretic benefit of the DIEP flap is that it minimizes the damage to the abdominal wall caused by autogenous (the patient's own skin and subcutaneous tissue) reconstruction. In the more widely used and traditional TRAM operation, one and occasionally two muscles of the abdomen are used to reconstruct the breast. While this can be done consistently and effectively, it can result in hernias, bulges and, especially when two muscles are used, significant weakness of the abdomen. These patients are then unable to perform sit-ups and other vigorous activities. The DIEP flap may prove to minimize these adverse effects while affording excellent and natural autogenous reconstruction.

Cleveland Clinic is one of a number of institutions nationwide now performing relatively large numbers of DIEP procedures.

Facelift and Facelift Alternatives

Facelift is the mainstay operation for the correction of facial aging. A number of patients, however, are unwilling to undergo facelift procedures for a variety of reasons. Clearly, a subset of patients would benefit from a lesser procedure. Anterior lipectomy and platysmaplasty is an operation popularized by our plastic surgery staff. This procedure was recently published by our team in the plastic surgery literature. The operation results in improvement predominantly in the profile with little change in the mid-face.

Other treatment alternatives for facial aging are available. These include both excisional (direct excision of the nasolabial folds and marionette lines) and nonexcisional procedures (fat injections and filler injections such as Sculptra, Juvederm and Restylane).

In addition, a variety of nonablative and ablative laser techniques are also available in the department and in our satellite offices.



Platelet-Rich Plasma

Tissue glues and tissue adhesives are being actively investigated by a number of units. Autogenous platelet-rich plasma is a component of the patient's own blood that can be drawn at the time of surgery, centrifuged to concentrate the platelets and then re-injected in the surgical field at the time of surgery. Potential benefits include the obliteration of dead space and prevention of seromas and hematomas and the enhancement of wound healing. Wound healing enhancement is being studied in our plastic surgery research laboratory in small animals and may prove to be effective in maximizing graft-take in a number of clinical situations.

In concert with the Section of Dentistry, platelet-rich plasma is also being investigated to enhance bone healing. This is being studied in patients who are undergoing wisdom tooth extraction. At the current time, it is too early to say it is an effective treatment, although this possibility is extremely intriguing.



New Knowledge |

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Staff Listing | Chairman



James E. Zins, M.D.

Chairman, Plastic Surgery

Appointed: 1992

Specialty Interests: Facial cosmetic surgery

Medical School: University of Pennsylvania School of Medicine, Philadelphia

Residency: Plastic Surgery – The Hospital of the University of Pennsylvania, Philadelphia

Fellowships: Craniofacial Research Fellow – The Hospital of the University of Pennsylvania and Children’s Hospital of Philadelphia, Philadelphia; Maxillofacial Fellowship – Great Ormond Street Hospital; Honorary Research Fellow – Surgery Unit, University College Hospital



Staff Listing |

Chairman

James E. Zins, M.D.

Quality Review Officer

Mark F. Hendrickson, M.D.

Main Campus Plastic Surgery Staff

James E. Zins, M.D., *Chairman*

Steven L. Bernard, M.D.

Risal S. Djohan, M.D.

Mark F. Hendrickson, M.D.

Raymond Isakov, M.D.

Armand R. Lucas, M.D.

Silvia C. Rotemberg, M.D.

Wong Moon, M.D.

Francis A. Papay, M.D.

Maria Siemionow, M.D., Ph.D.

Randall J. Yetman, M.D.

Beachwood

Outpatient surgery services

Armand R. Lucas, M.D.

Francis A. Papay, M.D.

Silvia C. Rotemberg, M.D.

Randall J. Yetman, M.D.

Independence

Shashidhar Kusuma, M.D.

Lorain

Steven L. Bernard, M.D.

Lutheran Hospital

Mark F. Hendrickson, M.D.

Solon

Mark F. Hendrickson, M.D.

Raymond Isakov, M.D.

Strongsville

Outpatient surgery services

Risal S. Djohan, M.D.

Shashidhar Kusuma, M.D.

Westlake

Steven L. Bernard, M.D.

Willoughby Hills

Wong Moon, M.D.



Department Contacts | How to Refer Patients

How to Refer Patients

Cleveland Clinic Main Campus

Comprehensive cosmetic plastic and reconstructive surgery options are available, as well as skin care procedures and products. Hair transplants are performed only on main campus.

Cleveland Clinic Family Health Centers

At our family health centers (next page), patients can consult with a plastic surgeon about the type of procedures or products that best fit their needs. Services vary, but generally, the family health centers offer laser hair reduction, skin care products and procedures, and surgical consultations. Some of our family health centers are equipped with outpatient surgery centers, where patients spend a short amount of time post-surgery, then return home to complete their recovery.

All family health and surgery centers are certified by Medicare, fully accredited by the Joint Commission on Accreditation of Healthcare Organizations and licensed by the Ohio Department of Health. In addition, our family health and surgery centers are backed by the resources of Cleveland Clinic, one of the nation's top hospitals.

Special Assistance for Out-of-State Patients

Our Medical Concierge patient care representatives help facilitate appointments for out-of-state patients.

Call 800.223.2273, ext. 55580, or send an e-mail to medicalconciierge@ccf.org

MyConsult Remote Second Medical Opinion

Visit elevelandclinic.org/myconsult, e-mail elevelandclinic@ccf.org or call 800.223.2273, ext. 43223.

For more information about the Department of Plastic Surgery, visit our Web site at clevelandclinic.org/plasticsurgery



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Lorain, Ohio 44053
440.988.5651

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440.899.5555

Willoughby Hills

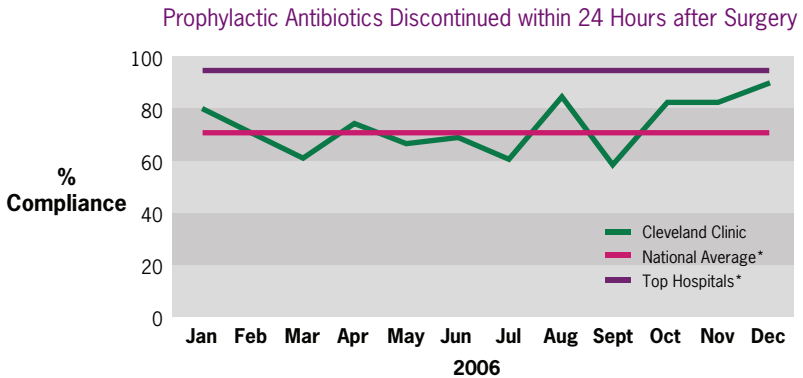
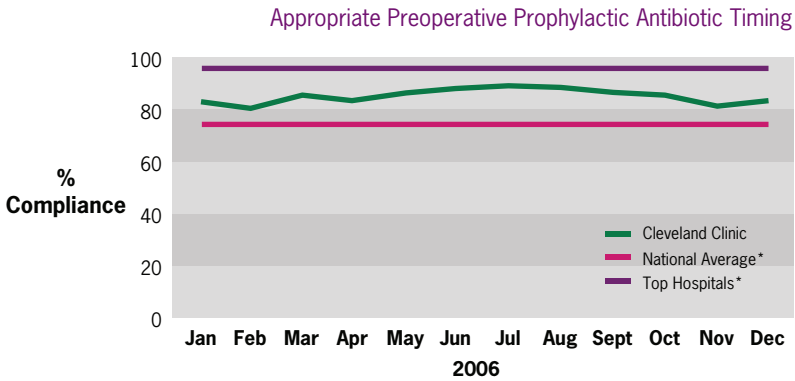
2570 SOM Center Road
Willoughby Hills, Ohio 44094
440.943.2500



Division of Surgery Overview |

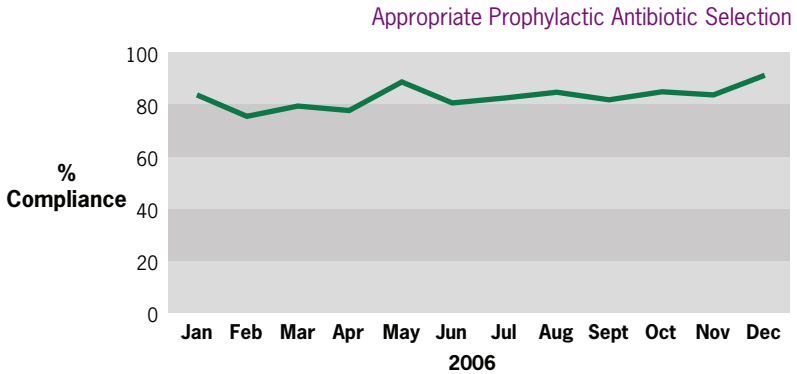
Surgical Infection Prevention

Surgical site infections contribute to surgical morbidity and mortality in all specialties. The timely administration and the appropriate selection of antibiotics prior to surgery in appropriate patients have been shown to reduce surgical site infections. A multidisciplinary team, involving Surgery, Infectious Disease, Anesthesia, Nursing and Quality has been working to ensure that our patients receive their antibiotics in a timely fashion. Data collected show our successful results:



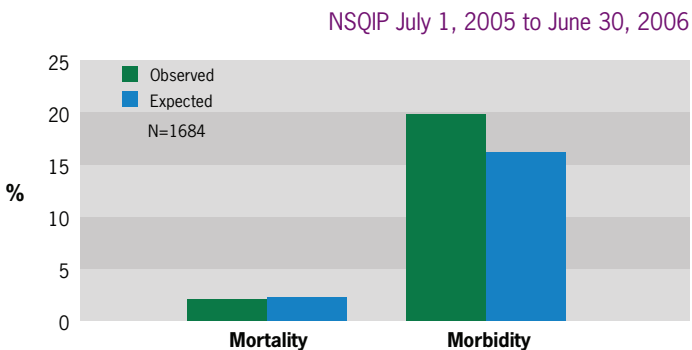
* Source: United States Department of Health and Human Services, Hospital Compare
Most current reported discharges April 2005 to March 2006.





National Surgical Quality Improvement Program

The American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) is a national program that objectively measures surgical outcomes. It reports risk-adjusted 30-day mortality and morbidity outcomes. Currently, the program includes surgical cases from Cleveland Clinic's departments of Colorectal Surgery, General Surgery and Vascular Surgery. As this program continues to grow at a national level, Cleveland Clinic is committed to expanding it to all surgical departments. We view NSQIP as the most valid, independent way to document our surgical outcomes and provide a basis for ongoing performance improvement.



Cleveland Clinic Overview |

Cleveland Clinic, founded in 1921, is a not-for-profit academic medical center that integrates clinical and hospital care with research and education. Today, 1,700 Cleveland Clinic physicians and scientists practice in 120 medical specialties and subspecialties.

Cleveland Clinic's main campus, with 41 buildings on 130 acres in Cleveland, Ohio, includes a 1,000-bed hospital, outpatient clinic, subspecialty centers and supporting labs and facilities. Cleveland Clinic also operates 13 family health centers, eight community hospitals, two affiliate hospitals, and a medical facility in Weston, Florida.

At the Cleveland Clinic Lerner Research Institute, hundreds of principal investigators, project scientists, research associates and postdoctoral fellows are involved in laboratory-based research. Total annual research expenditures exceed \$150 million from federal agencies, non-federal societies and associations, and endowment funds. In an effort to bring research from bench to bedside, Cleveland Clinic physicians are involved in more than 2,400 clinical studies at any given time.

In September 2004, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University opened and will graduate its first 32 students as physician-scientists in 2009.

For more details about Cleveland Clinic, visit clevelandclinic.org



Online Services |

eCleveland Clinic

eCleveland Clinic uses state-of-the-art digital information systems to offer several services, including remote second opinions through a secure Web site to patients around the world; personalized medical record access for patients; patient treatment progress access for referring physicians (see below); and imaging interpretations by the Department of eRadiology's subspecialty trained academic radiologists. For more information, please visit eclevelandclinic.org.

DrConnect

Online Access to Your Patient's Treatment Progress

Whether you are referring from near or far, our new eCleveland Clinic service, **DrConnect**, can streamline communication from Cleveland Clinic physicians to your office. This new online tool offers you secure access to your patient's treatment progress at Cleveland Clinic. With one-click convenience, you can track your patient's care using the secure **DrConnect** Web site. To establish a **DrConnect** account, visit eclevelandclinic.org or e-mail drconnect@ccf.org.

MyConsult

MyConsult Remote Second Medical Opinion is a secure, online service providing specialist consultations and remote second medical opinions for more than 600 life-threatening and life-altering diagnoses. **MyConsult** remote second medical opinion service allows you to gather information from nationally recognized specialists without the time and expense of travel. For more information, visit eclevelandclinic.org/myconsult, e-mail eclevelandclinic@ccf.org or call 800.223.2273, ext 43223.



Cleveland Clinic Contact Numbers |

How to Refer Patients

24/7 Hospital Transfers or Physician Consults
800.553.5056

General Information

216.444.2200

Hospital Patient Information

216.444.2000

Patient Appointments

216.444.2273 or 800.223.2273

Medical Concierge

Complimentary assistance for out-of-state patients and families
800.223.2273, ext. 55580, or email: medicalconcierge@ccf.org

International Center

Complimentary assistance for international patients and families
216.444.6404 or visit www.clevelandclinic.org/ic

Cleveland Clinic in Florida

866.293.7866

www.clevelandclinic.org



Cleveland Clinic is determined to exceed the expectations of patients, families and referring physicians. In light of this goal, we are committed to providing accurate and timely information about our patient care.

Through participation in national initiatives, we support transparent public reporting of healthcare quality data and participate in the following public reporting initiatives:

- Joint Commission Performance Measurement Initiative (www.qualitycheck.org)
- Centers for Medicare and Medicaid (CMS) Hospital Compare (www.hospitalcompare.hhs.gov)
- Leapfrog Group (www.leapfroggroup.org)
- Ohio Department of Health Service Reporting (www.odh.state.oh.us)

In addition, this publication was produced to assist patients and referring physicians in making informed decisions. To that end, information about care and services is provided, with a focus on outcomes of care. For more information, please visit the Cleveland Clinic Quality Web site at clevelandclinic.org/quality.



9500 Euclid Avenue, Cleveland, OH 44195

Cleveland Clinic is a not-for-profit multispecialty academic medical center. Founded in 1921, it is dedicated to providing quality specialized care and includes an outpatient clinic, a hospital with more than 1,000 staffed beds, an education division and a research institute.

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Cover photograph by Pat Shoda