

# Mersilene Mesh Chin Augmentation

## A 14-Year Experience

Edward J. Gross, MD; Mark M. Hamilton, MD; Kelly Ackermann, RN, BSN; Stephen W. Perkins, MD

**D**uring the past 20 years, a variety of alloplastic materials have been introduced for chin augmentation. Mersilene mesh (Ethicon, Sommerville, NJ), introduced in 1950, demonstrates many qualities that make it an ideal implant. This article reviews the senior author's (S.W.P.) successful 14-year experience using Mersilene mesh chin implants. Between 1983 and 1997, 264 patients underwent chin implantation procedures. The results show a low rate of infection (0.8%) and displacement (1.5%). There were 14 temporary paresthesias and no cases of permanent anesthesia. There were no incidences of absorption, rejection, or extrusion. Mersilene provides a soft, natural appearance to the chin, and it continues to be our choice for chin implantation.

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The chin, like the nose, is a prominent facial feature that projects an aesthetic image that is open to a variety of social interpretations. Microgenia, or a small chin, conveys weakness, whereas a strong chin conveys power and determination. Interestingly, artists have consistently portrayed a stronger chin than generally exists in reality, and this depiction of beauty crosses cultural boundaries.<sup>1</sup> Moreover, many patients are unaware of their chin retrusion, and this is an area of cosmetic surgery where the surgeon is justified in giving recommendations.

Chin augmentation, or mentoplasty, is a cosmetic surgical procedure to correct chin retrusion or microgenia. This usually requires placement of an alloplastic material over the pogonion, which results in increased chin projection and a more aesthetically balanced facial profile. The alternative procedure, sliding genioplasty or horizontal osteotomy, is performed less frequently and since most patients requiring chin augmentation have normal occlusion (angle, class 1), orthognathic surgery is seldom required.

Opinions on what constitutes the ideal chin projection or facial profile have been far from unanimous, and thus numerous methods have evolved for measurement. These are beyond the scope of this article. In the western hemisphere, however, the facial profile is generally considered aesthetically "balanced" when the chin approximates a vertical line dropped from the lower lip while the patient's head is in the Frankfort position.<sup>2</sup>

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During the past 20 years, alloplastic implants have become popular because of their ready availability, lack of donor site morbidity, and improved host tolerances. Materials such as acrylic, Silastic (solid silicone; Michigan Medical Corporation, Santa Barbara, Calif), Supramid (polyamide nylon mesh; Ethicon, Sommerville, NJ), Proplast (polytef; Novamed, Chicago, Ill), Medpor (porous polyethylene; Porex Surgical Inc, College Park, Ga), and Gore-Tex (polytetrafluoroethylene [ePTFE]; W. L. Gore & Associates Inc, Flagstaff, Ariz) have been used; however, each implant has its own shortcomings. Acrylic is brittle and palpable and causes bone resorption. Solid silicone can remain mobile, is easily palpable, and may produce a "button" chin.

*From the Department of Otolaryngology–Head and Neck Surgery, Indiana University School of Medicine (Drs Hamilton and Perkins), and Meridian Plastic Surgery Center (Drs Hamilton and Perkins and Ms Ackerman), Indianapolis, Ind. Dr Gross is in private practice in Elizabethtown, Ky.*

Polyamide nylon mesh undergoes hydrolytic degradation with a gradual loss of its bulk each year.<sup>3</sup> Proplast was withdrawn from the market in 1992 owing to problems with its use in the temporomandibular joint. Gore-Tex is too soft and pliable for use in the chin. Medpor is

somewhat inflexible and causes bone resorption. **Table 1** lists the common alloplastic chin implants and their reported problems.<sup>4,9</sup>

Mersilene mesh is a nonabsorbable polyester fiber sheet introduced in 1950 for the repair of abdominal hernias. This material has excellent tensile strength, durability, and host tolerance. It does not shrink, is immobile because of good tissue ingrowth, and is essentially undetectable by palpation. There have been no reports of mandibular erosion, and it conforms well with the contours of the mandible. No significant clinical adverse effects have been reported from Mersilene's component fibers despite its common use for facial repair (package insert, Mersilene mesh; Ethicon, Sommerville, NJ, 1998). The 30 × 30-cm sheets can be cut into the desired shape without fraying or unraveling. Also, the Mersilene mesh material can be autoclaved as needed.

The most important advantage of Mersilene mesh is the natural appearance that it provides (**Figure 1** and **Figure 2**) There is no button chin appearance. Following implantation, the chin feels as a chin should. The im-

**Table 1. Common Alloplastic Chin Implants and Reported Problem(s)\***

Material	Trade Name	Problem
Solid silicone	Silastic	Mobility, bone resorption
Methylmethacrylate	Acrylic	Bone resorption, brittle
Polyester fiber mesh	Mersilene mesh	More difficult surgical placement
Porous polyethylene	Medpor	Surgical handling, bone resorption
Expanded polytetrafluoroethylene	Gore-Tex	Too soft, high cost
Polyamide mesh (nylon)	Supramid	Hydrolytic degradation

\*See the introductory textual material for the manufacturers' names and locations for the implant materials.



**Figure 1.** A, Preoperative lateral view before a facelift and chin augmentation with quadruple Mersilene mesh implant; B, 6-month postoperative lateral view; C, preoperative frontal view before the facelift and chin implant (same patient); D, 6-month postoperative view (same patient).

plant does not move or wiggle. This natural look and feel is not provided with other implants. We believe Mersilene mesh is an ideal chin implant for these reasons and for the many other advantages outlined below:

#### **Advantages of Mersilene Mesh**

- Long safety record
- Excellent patient tolerance
- Minimal tissue reaction
- Surgical adaptability
- Good tissue ingrowth
- Nondegradable
- Maintains pliability in vivo
- May be resterilized
- Inexpensive
- Noncarcinogenic
- Minimal infection rate
- Natural feel and appearance
- Not related to silicone

Chin augmentation is a relatively simple procedure that alone or in combination with other procedures may transform a good result into a surgical masterpiece. It should be made clear to the patient that the addition of a chin implant to improve facial balance will contribute to a better final result.

The patient analysis begins with an examination of the profile, full face, and occlusion. The patient's head is placed in the Frankfort position and the pogonion, or the most forward projecting portion of the chin, is visually compared with an imaginary vertical line dropped from the lower lip (nasal profile, projection, and lip position are considered simultaneously). Lower lip position is assessed at rest and during smiling to assess the depth of the labiomental sulcus and its relationship to the lower lip. In addition, the relative heights of the upper, middle, and lower third of the face are assessed. Occlusion is then evaluated. These findings are shown to the patient with a 3-sided mirror and the computer video imager. Cephalometric radiographs are not needed in most cases. Contraindications to augmentation mentoplasty include severe microgenia (requiring >10 mm of projection), shortened mandibular height with lower lip protrusion, severe periodontal disease, preexisting anatomical or functional impairment of the oral sphincter, age younger than 15 years, and prosthetic heart valves or ventriculoperitoneal shunts.

Mild microgenia is corrected with a "single" Mersilene mesh implant, which consists of 10 sheets of the folded fabric. Moderate microgenia is treated with a "double" implant or 20 sheets, and more substantial microgenia requires a "triple" or 30 sheets. Extension wafers are placed in cases of severe microgenia; however, the maximum amount of increased anteroposterior projection possible is approximately 10 mm. To date, only 1 long-term study using Mersilene mesh as a chin implant material has been published.<sup>2</sup> Our article will report a 14-year experience using Mersilene mesh for chin augmentation.

## **PATIENTS AND METHODS**

### **PATIENTS**

Over a 14-year period (1983-1997), 264 patients who underwent chin augmentation procedures at the Meridian

Plastic Surgery Center, Indianapolis, Ind, were entered into the study. The charts of all patients were reviewed for such problems as infection, displacement, paresthesia, resorption, rejection, pain, or patient dislike. All patients had undergone consultation and photography prior to surgery. Most patients undergoing the procedure were white, and all procedures were performed by the senior author (S.W.P). All procedures were performed on an outpatient basis with monitored anesthesia or intravenous sedation and local anesthetic.

### **METHODS**

The implants were constructed from a single 30 × 30-cm sheet of Mersilene mesh. To create a single implant, a 5 × 2-cm cardboard template is placed onto the outstretched sheet and the mesh folded on itself 9 consecutive times to achieve a rectangular configuration 10 layers thick (the template is then removed). A double implant is created in 2 steps. First, a 5 × 1-cm template is used to create a smaller implant subunit (also 10 sheets thick) in a similar fashion. This is then sutured on top of a single implant to produce a 2-tiered double implant 20 sheets thick. This triple is assembled by suturing together a double on top of a single using a 5-0 polyglyconate suture in a running horizontal mattress fashion. The implants are then packaged, labeled, and steam sterilized prior to implantation. From one 30 × 30-cm sheet, either 8 single, 6 double, or 3 triple implants can be created.

During surgery, the appropriate implant size is chosen and the edges are trimmed to create a tapered lateral border. Prior to implant insertion, the patient is administered 1000 mg of cefazolin sodium intravenously and the implant is soaked in a solution of bacitracin (50 000 U) and gentamycin sulfate (80 mg). No specific preparation of the oral cavity is performed, nor is the recipient site irrigated with antibiotic solution. No specific effort is made to avoid touching the mesh with the surgeon's sterile gloves. Sterile curved hemostats are used to hold the implant edges and guide it into the recipient site. Implants are inserted either through an intraoral or a submental approach.

### **Intraoral Technique**

A 2.5-cm submental incision is made through the inner aspect of the lower lip at least 1 cm above and parallel to the gingival labial sulcus. Blunt dissection is performed in the midline over the symphysis and carried down to the subperiosteal level using a Freer elevator. The dissection is carried just lateral and inferior to the mental foramina.

The appropriate-sized implant is chosen, trimmed, and soaked in bacitracin/gentamycin solution. A converse elevator is used to retract the soft tissues, and the implant is positioned under direct visualization. Close inspection and digital palpation confirms proper implant position and chin projection. A single 4-0 Dexon suture (Davis and Geck, Mansfield, Mass) is placed to close the superior edges of the periosteum, which also engages the implant. This creates a tight pocket and prevents implant movement. The muscular layers are then



**Figure 2.** A, Preoperative frontal view before a facelift, blepharoplasty, and triple Mersilene mesh chin implant; B, 6-month postoperative view (same patient); C, preoperative lateral view before the facelift, blepharoplasty, and triple Mersilene mesh chin implant (same patient); D, 6-month postoperative view (same patient).

approximated in a deep to superficial fashion using 4-0 Dexon interrupted sutures. The most superficial layer of the muscle is approximated using 5-0 Dexon interrupted sutures with buried knots, and the mucosa is closed with 5-0 plain gut running interlocking sutures.

#### Submental Approach

A horizontal 2-cm submental incision is made through the skin just posterior to the first submental crease. Sharp dissection is carried to the periosteal layer of the lower symphysis, and midline dissection is performed subperiosteally and inferior to the mental nerves. The remain-

der of the procedure is performed in a similar manner; however, the tacking suture encompassing the implant and the periosteum is placed inferiorly. The skin is closed in layers using 5-0 Dexon in the dermis and 6-0 mild chromic sutures at the skin level in a running interlocking fashion. In both techniques, the implant is positioned between the pogonion and menton, which results in the most natural chin profile.

After the incision is closed, Mastisol (Ferndale Laboratories, Ferndale, Mich) and Micropore (3M Corporation, Minneapolis, Minn) tan tape are applied to the skin overlying the anterior aspect of the chin. A circumferential head dressing encompassing the chin is applied us-

ing 4 × 4s and Kerlix for mild compression and hemostasis. The dressing remains in place overnight and is removed the following day. The patient is instructed to rinse the mouth with hydrogen peroxide and water following each meal and to take 500 mg of oral cephalexin hydrochloride twice daily for 4 days postoperatively. The patient returns in 1 week, 1 month, 3 months, 6 months, and each year thereafter.

## RESULTS

The patient characteristics and implant procedure information for all 264 patients are given below:

Characteristics	No. of Patients
Average age, y	43
Sex	
Men	29
Women	235
Approach	
Submental	138
Intraoral	126
Technique	
Subperiosteal	264
Implant	
Mersilene mesh	264
Size	
Single	32
Double	133
Triple	94
Quadruple	5

Most of the patients were women; their average age was 43 years. The most common implant size was a double, followed by a triple, then a single. The external or submental approach was more common, and all implants were placed in the subperiosteal plane. Patients were observed for a minimum of 1 year; the average follow-up period was 5 years. The longest follow-up to date has been 10 years on a substantial proportion of the patients.

The distribution of procedures performed with chin implants is given in **Table 2**. The most common procedure performed with chin implantation was rhinoplasty (n = 99). In these cases, the implant is placed first, usually using the intraoral approach. When performed with a facelift and submental liposuction (n = 88), the implant is placed using the submental approach.

The population of 264 patients experienced 6 major events that required intervention. These were 4 displacements and 2 infections. The overall complication rate was 2.3% (6/264). The infection complication rate was 0.8% (2/264), and the displacement complication rate was 1.5% (4/264). There was no difference in the complication rate with respect to the approach used. A summary of complications is given in **Table 3**.

One infection developed 1 month after intraoral placement of a chin implant. The patient initially did well until 1 month after the procedure when mucopurulent drainage was noted in the gingivolabial sulcus. The patient underwent a course of ciprofloxacin with no improvement, and the implant was removed. Despite this, at 1-year follow-up, the chin projection was still substantially improved over what it had been before the procedure. No further surgery was recommended.

**Table 2. Distribution of Chin Augmentation and Combination Procedures**

Chin Augmentation Procedure	No. of Patients
With rhinoplasty	99
With facelift and submental liposuction	88
With submental liposuction	38
Chin augmentation alone	20
With facelift, submental liposuction, and rhinoplasty	15
With submental liposuction and rhinoplasty	4
<b>Total</b>	<b>264</b>

**Table 3. Summary of Complications**

Level of Complication	Description	Patients, No. (%)
Major	Infection	2 (0.8)
	Displacement	4 (1.5)
	Permanent Paresthesia	0
Minor	Temporary Paresthesia	14 (5.3)
Other	Extrusion	0
	Pain	0
	Resorption	0
	Rejection	0
	Patient dislike	0
	Request for removal	0

Revision surgery was required for asymmetry or displacement in 4 patients. All of these occurrences were recognized within the first 6 weeks after surgery. Two patients on whom intraoral approaches were used had superior displacement of the implant with a resulting asymmetrical mucosal ridge in the gingivolabial sulcus. These 2 patients underwent chin implant revision and trimming using the intraoral approach. The 2 remaining patients had mild external asymmetries from probable initial malposition of the implant. An intraoral and external approach were used, respectively. These 2 patients underwent revision surgeries with removal of the original implant and replacement of a new Mersilene mesh implant. All of the patients did well following revision surgery.

As a minor complication, 14 patients (5.3%) complained of lower lip paresthesias during the week following surgery. All cases resolved completely by 6 weeks after surgery, and there were no cases of permanent numbness. One patient complained of "lower lip stiffness," which was causing a slight speech impediment. Her facial nerve and lower lip were intact, and the problem resolved without treatment. There were no cases of extrusion, rejection, absorption, pain, or patient dislike of the implant material.

## COMMENT

This study reports a large experience in long-term follow-up using Mersilene mesh for chin augmentation. This implant compares favorably with those in other studies (see **Table 4**) and is consistent with the 1990 report of McCollough et al.<sup>2</sup>

The infection rate in our series was quite low compared with others, which may be owing to the ability of the antibiotic solution to penetrate the porous mesh as well as the ability of white blood cells to move through

**Table 4. Complications of Chin Implants\***

Characteristics and Complications	Beekhuis, <sup>3</sup> 1984	Pitanguy, <sup>9</sup> 1986	McCullough, <sup>10</sup> 1979	Mahler, <sup>11</sup> 1982	McCullough et al., <sup>2</sup> 1990	Present Article, 1995
Material used	Polyamide	Silastic	Mersilene	Silastic	Mersilene	Mersilene
No. of patients	400	612	47	480	277	225
Infection rate	0.8	...	8†	1	2.5	0.4
Displacement rate	1.3	3.0	...	...	0.7	1.8
Overall complication rate	3.3	3.7	...	2.3	3.2	2.2

\*Unless otherwise indicated data are percentages. Ellipses indicate not applicable.

†Prior to soaking of implant in an antibiotic.

**Table 5. Chin Implant Comparisons\***

Implant Characteristic	Acrylic	Silastic	Mersilene	Medpor	Supramid	Gore-Tex
Preshaped	Yes	Yes	No	Yes	No	No
Mobility	Yes	Yes	No	No	No	No
Bone resorption	Yes	Yes	No	Yes	No	No
Tissue ingrowth	No	No	Yes	Yes	Yes	Minimal
Capsule formation	Yes	Yes	No	No	No	No
Surgical adaptability	Poor	Good	Good	Fair	Good	Fair
Palpable	Yes	Yes	No	No	No	No
Long-term predictability	Poor	Fair	Excellent	Good	Poor	...
Cost	Moderate	Moderate	Low	Moderate	Low	High
Overall rating	Poor	Fair	Excellent	Good	Fair	Fair

\*Proplast was withdrawn from the market in 1992 by the Food and Drug Administration. Ellipses indicate not applicable. See the introductory textual material for the nonproprietary names and the manufactures' names and locations for the implant materials.

the large pores (125 × 85 μm) within the mesh. This property also allows tissue ingrowth, which is another advantage of Mersilene. The sterile technique is important in implant handling; however, we do not believe that a "no touch" technique is mandatory. If the surgeon's gloves have been contaminated prior to the procedure, it would be prudent to change them.

One infection that occurred was a late complication relating to oral surgical trauma. This has been reported in other series.<sup>2,7,8</sup> As a general rule, we do not recommend prophylactic antibiotics to our patients undergoing subsequent surgical procedures unless they involve the mandible. In these cases, an oral cephalosporin is prescribed. The second infection occurred following apparent dehiscence of the intraoral closure following chin implantation. Obviously, careful multilayered closure is critical following intraoral chin implantation.

Three of the 4 implant displacements occurred in patients who had undergone an intraoral approach. Possible causes for this include excess implant size, inadequate pocket size, initial malposition, or tacking suture failure. All of these cases were identified early, and we believe the cause to be initial malposition, not true migration.

The 2 implants that were removed were firmly fixed by tissue ingrowth at 8 and 12 months, respectively; however, there was no difficulty in removing them. The implants retained flexibility, and there was no evidence of bone erosion over the mandibular symphysis. Additionally, there was no capsule formation.

The temporary lower lip paresthesia rate of 5.3% compares favorably with the results of Guyuron and Razewski<sup>12</sup> who reported an incidence of 46.9% temporary paresthesia, as well as a 9.4% incidence of permanent sensory loss

following alloplastic augmentation mentoplasty. Blunt dissection below the mental foramen and a visualization of the mental nerves are requisite for this procedure.

There were no requests for removal of the implant by any patient and no recorded dislikes. Likewise, there was no patient awareness of the implant. In fact, this implant is almost impossible to detect by palpation, even by the hands of an experienced surgeon.

A number of articles<sup>13-15</sup> have reported bone resorption underneath alloplastic implants, mainly acrylic, and Medpor. Mersilene mesh retains its pliability in vivo and has not been reported to have this problem. We have placed all of our implants in the subperiosteal plane and have not experienced this problem.

The most common chin implant to date has been Silastic. Despite criticism, it remains popular owing to its ease of insertion and short procedure time. The use of solid silicone sometimes results in unpredictable and unsatisfactory aesthetic results<sup>5,7,13,14</sup> (see **Table 5**).

The only disadvantage to using Mersilene mesh is the extra time needed to fold it into form preoperatively and trim it to shape intraoperatively. The low cost offsets this minimal labor. The retail price as of late 1997 was \$127.54 for a 30 × 30-cm sheet. When divided by the number of implants that can be created from a single sheet, the average cost is \$26.56 per implant. Additionally, unused mesh may be resterilized.

## CONCLUSIONS

The final choice of implant material engenders strong opinions from those who favor one material over another. We have found Mersilene mesh to be a safe, stable,

well-tolerated implant with a high degree of patient and surgeon satisfaction. Its use as a chin implant provides superior aesthetic results when compared with all other available alloplastic implants. Mersilene mesh continues to be our choice for chin implantation.

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Reprints: Mark M. Hamilton, MD, Meridian Plastic Surgery Center, 170 West 106th St, Indianapolis, IN 46290.

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