Reduction of Lipoplasty Risks and Mortality: An ASAPS Survey

Charles E. Hughes III, MD

**Background:** Previously published articles presenting rates for lipoplasty morbidity and mortality have reported on procedures performed before mid 1998.

**Objective:** The present survey reports on morbidity and mortality for lipoplasty procedures performed by members of the American Society for Aesthetic Plastic Surgery (ASAPS) from September 1, 1998, through August 31, 2000. It assesses whether ASAPS-member surgeons have modified their lipoplasty practices in accordance with the 1998 recommendations of the Lipoplasty Task Force.

**Methods:** In September 2000, ASAPS sent out a 4-page questionnaire to 1432 Active Members, all of whom were board-certified plastic surgeons. The survey included questions about complications and fatal outcomes associated with lipoplasty procedures, performance of combination procedures, patient selection, changes in lipoplasty and anesthesia techniques, and surgical facility accreditation. Completed surveys were anonymous and were mailed by respondents directly to an independent research firm for collation. Further data analysis was conducted by an independent statistician.

**Results:** A total of 754 questionnaires were returned, for a response rate of 53%. ASAPS members reported on 94,159 lipoplasty procedures. In all, 66% of the procedures were lipoplasty only, 20% were lipoplasty without abdominoplasty but with one or more additional procedures, and 14% were lipoplasty with abdominoplasty, with or without any other procedures. The most frequently reported postoperative event was nausea/vomiting (1.02%, or 1 per 98 procedures). The most frequently reported major complication was skin slough (0.0903%, or 1 per 1107 procedures). In all, there were 245 major complications, for a rate of 0.2602%. Death associated with lipoplasty performed as an isolated procedure was rare; the mortality rate was 0.0021%, or 1 per 47,415 procedures. Stated positively, the estimated non-mortality probability is 99.98%. When lipoplasty was performed with other procedures, excluding abdominoplasty, the rate was 0.0137%, or 1 per 7314 procedures. When lipoplasty was combined with abdominoplasty, with or without other procedures, the rate was 0.0305%, or 1 per 3281 procedures—a rate 14 times greater than that for lipoplasty only. Nearly 33% of respondents said that they had modified their approach to lipoplasty and/or their approach to patient selection within the last 24 months in accordance with published recommendations of the Lipoplasty Task Force.

**Conclusions:** The ASAPS survey documents the current safety of lipoplasty when it is performed as an isolated procedure by properly trained surgical specialists adhering to recommended standards of clinical practice. Further studies are needed to examine the factors that increase the risk in combined procedures as well as the effectiveness of prophylactic measures in avoiding complications.
According to statistics compiled by the American Society for Aesthetic Plastic Surgery (ASAPS), the number of cosmetic procedures nationwide increased 119% between 1997 and 1999; for lipoplasty, the most frequently performed cosmetic surgery, the number increased 62%. During the same period, concern about the safety of lipoplasty was a frequent topic in the news media.

Current data are needed to help establish the actual rates of complications and mortality associated with lipoplasty. The author, as Chair of the ASAPS Body Contouring Committee, was asked by the Society to oversee implementation of a survey to gather information on the safety of lipoplasty as performed by its members. Although the inherent limitations of self-reported data on surgical complications and deaths were recognized, it was felt that a significant response from ASAPS members would provide meaningful data.

**Background**

In 1989, Teimourian and Rogers reported on a survey of complications from 112,756 body contouring procedures performed by 935 board-certified plastic surgeons from January 1984 to January 1988. These included 75,591 major lipoplasty procedures (distinguishing between “major” and “minor” lipoplasty was left to the subjectivity of the reporting surgeon). The authors concluded that major lipoplasty, with a mortality rate of 2.6 deaths per 100,000 procedures (0.0026%, or 1 per 38,462) was a safe operation. Comparative data on abdominoplasty, gathered as part of the same survey, showed a much higher mortality rate—41.4 deaths per 100,000 procedures (0.0414%, or 1 per 2,415). Combination procedures were not addressed by the survey.

In January 2000, Grazer and de Jong suggested that the risk of death associated with lipoplasty had escalated to 1 per 5224 procedures (0.0191%). Their article was based on a random survey reporting on 496,245 lipoplasty procedures performed from 1994 to mid 1998. Although the survey was sent to 1200 board-certified plastic surgeons, including all ASAPS members, through educational meetings, instructional courses, and publications. The Lipoplasty Task Force data and recommendations were highlighted by Rohrich and Beran in 1999. In 2000, ASAPS conducted the Survey on Office Surgery and Lipoplasty to gather current data on ASAPS members’ practices.

**Materials and Methods**

In September 2000, ASAPS sent out a 4-page questionnaire (“ASAPS Survey on Office Surgery and Lipoplasty”) to 1432 Active Members; 1398 of these members were certified by the American Board of Plastic Surgery (ABPS) and practiced within the United States, and the other 34 had certification in plastic surgery from the Royal College of Physicians and Surgeons of Canada (considered the Canadian equivalent of ABPS certification). The median number of years in plastic surgery practice of the survey respondents was 20. A previous survey of the ASAPS membership had shown that 69% of the average member’s practice is devoted to aesthetic (cosmetic) surgery.

The primary goals of the survey were to:

- assess rates of morbidity and mortality associated with lipoplasty procedures performed by ASAPS members from September 1, 1998, through August 31, 2000, and
determine whether ASAPS members have significantly changed any aspects of their approach to patient evaluation for lipoplasty or lipoplasty since September 1998, when physician education by plastic surgery organizations concerning lipoplasty risk factors was sharply accelerated.

The survey included questions to determine the percentage of ASAPS members who currently operated in surgical facilities that were (1) accredited by a national or state-recognized accrediting agency/organization, (2) state-licensed, and/or (3) Medicare-certified under Title XVIII. In addition, survey questions were developed to determine the percentage of ASAPS members, among those whose surgical facilities did not meet one or more of those criteria, who were planning to seek facility accreditation, licensure, or certification in the near future. This information was important in the light of the Joint Policy Statement on Accreditation of Non-Hospital Surgery Facilities,8 approved by the ASAPS Board of Directors on February 19, 2000; the statement called for each ASAPS member to perform all plastic surgery procedures involving anesthesia (other than minor local anesthesia and/or minimal oral tranquilization) only in surgical facilities meeting at least one of the criteria. The policy statement included a 3-year phase-in period with a deadline of July 1, 2002.

An independent research firm in Columbus, Ohio, conducted the survey mailing using address labels for ASAPS Active Members that had been provided by the Society. Completed surveys, which were anonymous, were mailed directly to the firm by respondents. After the collation of data, a statistical analysis was conducted by an independent statistician affiliated with New York University.

**Results**

A total of 754 questionnaires were returned, for a response rate of 53%. The tabulated surveys showed that respondents performed a total of 439,132 cosmetic surgical procedures from September 1, 1998, through August 31, 2000; the average was 302 procedures per year per surgeon. These data are comparable to those obtained in other studies.1,9 In all, 61.4% of the procedures were performed in office-based surgical facilities. Among ASAPS respondents operating in office-based facilities, 65.2% said that their facility was state-licensed, Medicare-certified under Title XVIII, or accredited by a national or state-recognized accrediting organization (Table 1). However, 95.1% of responding ASAPS members provided answers indicating that they either were already in compliance or planned to be in compliance with the Joint Policy Statement requiring surgical facility accreditation, licensure, or certification by July 2002.

Of those respondents who indicated that they would not seek facility accreditation, a significant number said that they performed only minor procedures in the office-based unit or that they planned to switch to another facility. As was to be expected, given that all respondents were board-certified in plastic surgery, virtually all (97.8%) indicated that they had hospital privileges for the procedures that they performed in an office-based setting.

**Lipoplasty morbidity**

ASAPS members reported specifically on a total of 94,159 lipoplasty procedures. In all, 66% of the total number of lipoplasty procedures were lipoplasty only; 20% were lipoplasty without abdominoplasty but with one or more other procedures; and 14% involved lipoplasty with abdominoplasty, with or without any other procedures. The most frequently reported postoperative event was nausea/vomiting (1.02%, or 1 per 98 procedures). The most frequently reported nonfatal major complication was skin slough (0.0903%, or 1 per 1107 procedures). In all, there were 245 major nonfatal complications in the 94,159 reported procedures. This number compares favorably with the 175 significant complications in 24,295 lipoplasty procedures reported by the Lipoplasty Task Force.10 With regard to our sur-

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**Table 1. Accreditation of office-based surgical facilities by organization (multiple responses allowed)*

<table>
<thead>
<tr>
<th>Organization</th>
<th>Percentage of respondents with accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Association for Accreditation of Ambulatory Surgery Facilities (AAASAF)</td>
<td>77.4</td>
</tr>
<tr>
<td>Accreditation Association for Ambulatory Health Care (AAAHC)</td>
<td>7.6</td>
</tr>
<tr>
<td>Joint Commission for Accreditation of Health Organizations (JCAHO)</td>
<td>4.7</td>
</tr>
<tr>
<td>Medicare</td>
<td>19.4</td>
</tr>
<tr>
<td>State-licensed</td>
<td>18.6</td>
</tr>
</tbody>
</table>

*Among 65% of ASAPS respondents operating in accredited office-based surgical facilities.
Reduction of Lipoplasty Risks and Mortality: An ASAPS Survey

Survey, nonfatal complications and their frequencies are listed in Table 2.

**Lipoplasty Mortality**
Death associated with lipoplasty performed as an isolated procedure was rare; the mortality rate was 0.0021%, or 1 per 47,415 procedures. Stated positively, the estimated non-mortality probability is 99.98%. When lipoplasty was performed with other procedures, excluding abdominoplasty, the mortality rate was 0.0137%, or 1 per 7314 procedures. When lipoplasty was combined with abdominoplasty, with or without other procedures, the mortality rate was 0.0305%, or 1 per 3281 procedures (Table 3). It is noteworthy that in our survey, the mortality rate for lipoplasty combined with abdominoplasty is comparable to, but lower than, the mortality rate for abdominoplasty alone (0.0414%, or 1 per 2415 procedures) that was reported in 1989 by Teimourian and Rogers.2

**Discussion**
Data from this survey suggest that significant progress has been made in improving patient safety in cosmetic surgery. First, the percentage of ASAPS members operating in office-based surgical facilities that are accredited, state-licensed, or Medicare-certified is substantial and increasing. Second, the survey findings suggest that lipoplasty research and educational efforts have begun to yield measurable results.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Rate (1 complication in every __ procedures)</th>
<th>Rate (1 death in every __ procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin slough</td>
<td>0.0903</td>
<td>0.0021</td>
</tr>
<tr>
<td>Ultrasound-assisted lipoplasty skin burns</td>
<td>0.0712</td>
<td>0.0137</td>
</tr>
<tr>
<td>Deep vein thombophlebitis</td>
<td>0.0329</td>
<td>0.0021</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>0.0266</td>
<td>0.0021</td>
</tr>
<tr>
<td>Excessive blood loss</td>
<td>0.0149</td>
<td>0.0021</td>
</tr>
<tr>
<td>Fluid overload</td>
<td>0.0138</td>
<td>0.0021</td>
</tr>
<tr>
<td>Fat emboli</td>
<td>0.0053</td>
<td>0.0021</td>
</tr>
<tr>
<td>Cannula penetration of abdominal cavity</td>
<td>0.0021</td>
<td>0.0021</td>
</tr>
<tr>
<td>Lidocaine toxicity</td>
<td>0.0021</td>
<td>0.0021</td>
</tr>
<tr>
<td>Surgical shock</td>
<td>0.0011</td>
<td>0.0021</td>
</tr>
</tbody>
</table>

The Lipoplasty Task Force, in 1998, reported on data from lipoplasty procedures performed by board-certified plastic surgeons (however, not exclusively by ASAPS members) and presented a mortality rate of 0.02%, or 1 death per 5000 lipoplasty surgeries.10 As a result of these findings, the Lipoplasty Task Force emphasized to plastic surgeons that performing multiple unrelated procedures at the same time was among several factors that appeared to increase lipoplasty risks.

The data obtained from the current ASAPS survey underscore this risk more directly than those from any previous survey. At the same time, however, the mortality rate of 1...
per 47,415 procedures when lipoplasty is performed as an isolated procedure presents a strong case for lipoplasty safety. The survey confirms that when other procedures are performed with lipoplasty, the risks increase; the specific combination of lipoplasty and abdominoplasty presents the greatest risk.

Significantly from the standpoint of increased patient safety, nearly one third (32.7%) of ASAPS respondents said that they had modified their lipoplasty practice within the 24 months of the survey period (Table 4). Of those indicating that they had made changes, the most frequent modification was that they were less likely to perform lipoplasty in combination with certain other procedures. Almost as common, however, were using stricter patient selection criteria, limiting the length of surgery, and removing a smaller volume of fat.

Proper patient selection is always of utmost importance in the safety of cosmetic surgery. ASAPS members responding to the survey indicated that there were many situations in which they were likely to decide against performing lipoplasty on particular patients because of concerns about safety or for other reasons (Table 5).

In 1998, the Lipoplasty Task Force cited poor patient health as a significant risk factor in lipoplasty. Virtually all responding ASAPS surgeons (98.4%) said that they would be likely to deny lipoplasty surgery to an individual with a serious medical problem. Interestingly, however, almost as many (97.9%) said that they would be unlikely to perform surgery on a prospective patient who had unrealistic expectations. Other groups of patients on whom a majority of respondents said that they would probably be unwilling to perform lipoplasty included (1) patients with inadequate skin tone who were unwilling to undergo necessary skin tightening procedures (78.4%), (2) patients who were significantly above their ideal body weight (68.3%), and (3) patients with histories of alcohol or drug abuse (65.4% of respondents; Tables 5 and 6). Nearly half (45.9%) of the respondents said that they would be likely to deny lipoplasty surgery to a heavy smoker.

The Lipoplasty Task Force report suggested that excessive amounts of fluid and local anesthesia were other factors that can increase the surgical risk associated with lipoplasty. The current ASAPS survey results show that 98% of respondents were using a wetting solution-to-aspirate volume of 2:1 or less.

The final risk factor cited by the Lipoplasty Task Force was excessive removal of fat. In the 24 months of the study, most (54.3%) of the lipoplasty procedures reported involved removal of 2500 cc or less of supernatant fat. Only 5.4% of patients underwent so-called “large-volume” lipoplasty, in which more than 5000 cc of supernatant fat is removed (Table 7).

**Conclusions**

The ASAPS survey documents the current safety of lipoplasty when it is performed as an isolated procedure...
by a properly trained surgical specialist adhering to recommended standards of clinical practice.

Surgeons and their patients must carefully consider both the benefits and the risks of combining lipoplasty with other procedures, realizing that the risk of complications increases substantially when multiple procedures are performed. Antiembolism measures should be implemented routinely. Compression devices to minimize the risk of deep vein thrombosis and embolus have recently been recommended for any procedure performed with the patient under general anesthesia and lasting longer than 1 hour. Proper patient selection, good clinical judgment in anesthesia technique, and prudent postsurgical monitoring are also necessary to achieve maximum patient safety.

Safety measures include using properly equipped facilities with appropriate procedures in place for handling emergencies. In addition to mandatory accreditation of office-based surgical facilities, there should be mandatory reporting of all untoward events associated with cosmetic surgery. Such records, as well as the requirement of appropriate credentials for physicians in the office-based surgical environment, ultimately will help to improve standards of care and make surgery safer for all patients undergoing cosmetic procedures.

By July 2002, ASAPS members almost universally will be operating in accredited surgical facilities. As this survey demonstrates, a significant number of surgeons have changed their approach to lipoplasty as a result of the increased educational focus on risk reduction. The combination of these 2 factors suggests that among ASAPS members the safety record for lipoplasty will improve further over the next decade.

Outcome studies on the effects of combined procedures on surgical risk will also be important to the continuation of progress in meeting patient needs for safe and effective cosmetic surgery. The morbidity and mortality rates for specific procedure combinations need careful scrutiny. We need more information to determine whether it is the combination of certain procedures or other factors, such as extended operating time, that most significantly influence the rate of complications. Risk factors associated with abdominoplasty should be investigated. We also need additional data to help us determine whether antiphlebitis/antiembolism measures actually are effective in lowering the rate of complications and mortality for lipoplasty and other specific procedures or combinations of procedures.

Many surveys result in data that should provoke further study; this is one of them. An ongoing effort to improve results by carefully analyzing outcomes is vital if we are to serve our patients well.

References


Commentary

by Mark L. Jewell, MD

Historically, lipoplasty has been considered a safe procedure. Data such as those presented in 1989 by Teimourian and Rogers1 show that in the mid 1980s, lipoplasty had a rate of morbidity and mortality comparable to or lower than the rates for other major cosmetic surgical procedures. Although substantially flawed, the study by Grazer and de Jong2 of lipoplasty procedures performed between 1994 and mid 1998, which showed a mortality rate of 0.0191%, or 1 per 5224 procedures, suggested that something had changed since the 1980s. In retrospect, it seems that during a relatively brief period in the evolution of lipoplasty technique, limitations necessary to achieve the highest level of safety were, in some instances, unknowingly or unwisely overlooked or ignored. Recent changes in the way that plastic surgeons approach lipoplasty surgery and patient selection are attributable, in large part, to the efforts of the professional plastic