The Shaw Scalpel and Development of Facial Nerve Paresis After Superficial Parotidectomy

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Objective: To evaluate the independent relationship of the Shaw scalpel on the development of facial nerve injury in patients undergoing superficial parotidectomy.

Methods: A retrospective review of 77 cases between 1991 and 1996. Forty-eight percent of the surgical procedures were performed using the Shaw scalpel, and 52% were performed using a cold knife. To assess whether use of the Shaw scalpel is an independent predictor of facial nerve injury, both univariate analysis and regression analysis were used in the statistical analysis of the data.

Results: Fifty-four percent of the patients who underwent a parotidectomy in which the Shaw scalpel was used developed postoperative facial weakness, compared with 14% of those who underwent a cold knife parotidectomy (P = .002).

Conclusion: Multivariate analysis revealed that use of the Shaw scalpel represents an independent risk factor for development of facial nerve weakness after parotidectomy (P = .01), even after other risk factors are controlled for.


Use of the Shaw scalpel was advocated in the early 1980s as a means of decreasing operative time by control of bleeding. The advantage of using the Shaw scalpel over conventional electrosurgical units (ESU, Valleylab, Boulder, Colo) is reduced tissue damage. Some surgeons choose to use ties rather than electrosurgical units to control bleeding. Parotid gland surgery involves the additional consideration of facial nerve injury. Use of an electrosurgical unit near the nerve may lead to facial nerve injury. Dissection of the gland from the facial nerve can be time consuming. There is no standardized technique for dissection of the gland. Some surgeons prefer to use clamps while dissecting the nerve and to use ties to control the bleeding, while others use the Shaw scalpel to control bleeding and to speed up the dissection. The use of the Shaw scalpel in parotid surgery and mainly around the facial nerve has been advocated.

The aim of this study was to evaluate the independent relationship of the Shaw scalpel on the development of facial nerve injury in patients undergoing superficial parotidectomy at an academic institution where surgeons have different opinions about the use of the Shaw scalpel around the facial nerve.

RESULTS

A Shaw scalpel was used in 26 parotidectomies (48%), and a cold knife was used in 28 (52%). A total of 18 patients (33%) had postoperative facial nerve paresis, ranging from grade II to grade IV on the House-Brackmann scale. The follow-up period ranged from 6 months to 2 years (mean, 13 months). Four patients (7%) continued to have facial nerve weakness up to the time of the last follow-up visit. Fourteen (54%) of the patients who underwent a hot knife (Shaw scalpel) parotidectomy developed facial nerve paresis, compared with only 4 (14%) of those who underwent a cold knife parotidectomy (P < .002). Four patients who continued to have facial nerve weakness up to their last follow-up visit were in the hot knife group.

Univariate analysis of the other variables revealed that patients with a benign or malignant tumor were predisposed to facial nerve weakness compared with those who had congenital or inflammatory disease. This tendency, however, was not statistically significant (P = .06). Age, sex, side operated on, duration of procedure, surgeon, and time when procedure was performed did not have any significance (P > .05).
PATIENTS AND METHODS

All surgical procedures involving the parotid gland that were performed between 1991 and 1996 were retrospectively reviewed. A total of 77 parotidectomies were identified. Patients who had (1) undergone total parotidectomy, (2) preoperative facial nerve paresis or paralysis, or (3) facial nerve injury, whether accidentally or intentionally, during the procedure were excluded. The remaining 54 cases were analyzed (Table). The mean age of the patients was 52.4 years (age range, 1-85 years). There were 26 males and 28 females. Data collected included age, sex, duration of procedure, individual surgeon, time of procedure, side operated on, and pathologic findings. All procedures were performed by resident staff members under close supervision by 4 faculty members.

A modified Blair incision is made, and the superficial facial layer is elevated anteriorly until the mass is exposed. At this point, the parotid gland is separated from the cartilaginous external auditory canal and the anterior border of the sternocleidomastoid muscle. The main facial nerve trunk is then identified after its exit from the stylomastoid foramen. Dissection of the nerve from the gland is then carried out proximally to distally, and the parotid gland is sectioned either with a cold blade or with the Shaw scalpel. A No. 10 blade, which was used at a temperature of 220°C, was connected to the Shaw machine. To assess whether the Shaw scalpel is an independent predictor of facial nerve paresis, both univariate and multivariate regression analyses were used.

Multiivariate analysis using a backward logistic regression model was then performed. The factors included were age, sex, time and duration of procedure, side operated on, surgeon, whether a cold knife or a Shaw scalpel was used, and the pathologic findings. The analysis revealed that use of the Shaw scalpel was the only predictor of facial nerve paresis ($P$=.01).

**COMMENT**

Facial nerve paresis or paralysis is one of the most common complications after parotid surgery. There are numerous causes of facial nerve paresis, including resection of the nerve, local pressure on the nerve during dissection, forceful stretching of the nerve, crush injury, postoperative edema, and postoperative hematoma. Heat damage to the nerve caused by the use of electrocautery or the Shaw scalpel near the nerve can be added to this list.

The incidence of facial nerve weakness after superficial parotidectomy ranges from 10% to 50%. It is believed, however, that the incidence is higher after total parotidectomy. In 1981, Fee published an article on the use of the Shaw scalpel in head and neck procedures. He found that the advantages were better hemostasis, less need for transfusion, and less time in the operating room. In another study, published in 1984, Fee and Handen used the Shaw scalpel on 25 patients undergoing parotid surgery and compared the results with those in 25 patients who underwent conventional parotidectomy. Their study revealed that 31% of the patients in the hot knife group had temporary facial nerve paresis, compared with 73% of those in the cold knife group. However, 13 patients had a total parotidectomy and 2 had an associated neck dissection.

Prior to this study, we had the impression that patients who underwent a Shaw scalpel parotidectomy had a higher incidence of temporary facial nerve paresis than those who underwent a cold knife parotidectomy. Therefore, we decided to evaluate the independent relationship of the Shaw scalpel in the development of temporary facial nerve paresis.

The crude analysis of the data suggested that the use of the Shaw scalpel was a risk factor for the development of temporary facial nerve paresis ($P$=.002). The crude analysis of all the other factors, including age, sex, side operated on, time of procedure, duration of procedure, and surgeon were not risk factors. We evaluated the surgeon’s role and the development of facial nerve paresis and found the results to be not significant. Since most procedures were performed by residents, we decided to find out whether the incidence of facial nerve paresis was higher in procedures that were performed at the time when the senior residents were starting (July-October): the results were not significant. The only other factor was pathologic findings in the parotid gland, although it did not reach significance. Patients with benign or malignant lesions were at higher risk of developing temporary facial nerve paresis than those with inflammatory or congenital lesions. Multivariate analysis of all the risk factors, especially after the pathologic findings were controlled for, demonstrated that the Shaw scalpel continued to be an independent risk factor.

We believe that use of the Shaw scalpel around the facial nerve can cause heat damage to the nerve, resulting in temporary facial nerve paresis. Thus, its use around the nerve is not recommended.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Shaw Scalpel</th>
<th>Cold Knife</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients (N=54)</td>
<td>26 (48)</td>
<td>28 (52)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Male</td>
<td>13 (50)</td>
<td>13 (46)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Left side</td>
<td>12 (48)</td>
<td>12 (46)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Mean age, y</td>
<td>51</td>
<td>54</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Pathologic findings, %</td>
<td></td>
<td></td>
<td>.06</td>
</tr>
<tr>
<td>Congenital</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Inflammatory</td>
<td>6</td>
<td>12</td>
<td></td>
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<tr>
<td>Benign</td>
<td>33</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Malignant</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Temporary facial nerve paresis</td>
<td>14 (54)</td>
<td>4 (14)</td>
<td>.002</td>
</tr>
</tbody>
</table>

*Values are expressed as number (percentage) unless otherwise indicated. Ellipses indicate not applicable.
CONCLUSIONS

The Shaw scalpel is another tool that is available for the surgeon for use in head and neck procedures. The advantages include better hemostasis than with electrosurgical units, with better visibility at the incision site, and, when flaps are raised, less apparent tissue damage. The main disadvantage is the additional expense of the blades.

We think that the Shaw scalpel is an excellent tool to use on the skin and when elevating the subcutaneous tissue and muscle. However, we do not recommend its use close to the facial nerve. Heat damage to the nerve can be added as a potential cause of temporary facial nerve paresis during superficial parotidectomy.

Accepted for publication December 4, 1997.

REFERENCES