Prevention of wound complications in salvage pharyngolaryngectomy by using well-vascularized flaps

Akihiro Sakai, Kenji Okami, Koji Ebisumoto, Ryosuke Sugimoto, Masahiro Iida
Department of Otolaryngology, Tokai University, School of Medicine, Isehara, Japan

ABSTRACT

Recently, salvage surgery has been more frequently performed after curative radiation therapy because the use of chemoradiation therapy (CRT) has become common for laryngeal or hypopharyngeal advanced cancer. However, salvage surgery for laryngeal or hypopharyngeal cancer is associated with an increased risk of pharyngocutaneous fistula (PCF) formation as well as an increased probability of severe complications such as severe infections and carotid rupture.1

In our previous study, we reported that CRT was a significant risk factor for carotid rupture and that total laryngectomy (TL) and total pharyngolaryngectomy (TPL) following CRT tends to induce more severe complications.2 Avoidance of PCFs is, therefore, important for head and neck surgeons, considering prevention of and countermeasures against PCFs has become necessary. Currently reported methods of preventing PCF formation include procedures in which the pharyngeal suture line is covered well-vascularized tissues (PMCFs) and deltopectoral flaps (DPFs) since 1999.3

This study aimed to determine whether coverage of suture lines during salvage surgery can reduce the incidence of PCFs. The suture line is covered directly with well-vascularized, non-irradiated tissues as a preventive measure for PCFs. We successfully reduced the incidence of PCFs in the flap group. In addition, cases with PCFs did not report carotid rupture, and the PCFs were conservatively closed. We believe that coverage of suture lines with well-vascularized tissues has certain advantages in preventing PCFs and severe complications.

METHODS AND MATERIALS

This retrospective case-control study was based on the review of 52 patients who underwent salvage TL or TPL between 2001 and 2013. All patients with salvage TL or TPL in the period were included. The patients who were considered to be at high risk for PCF formation had undergone chemoradiation therapy, or other systemic complications such as diabetes mellitus (DM).

Flap coverage was performed in 13 patients (flap group) but not in 39 patients (the non-flap group). The differences were significant (P = 0.057).

Conclusions

We successfully reduced the incidence of PCFs in high-risk patients undergoing surgery using PMCFs and DPFs to cover suture lines.

REFERENCES


Table 1. Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All patients (n = 52)</th>
<th>Non-flap (n = 39)</th>
<th>Flap (n = 13)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>27 (51.9)</td>
<td>22 (56.4)</td>
<td>5 (38.5)</td>
<td>NS</td>
</tr>
<tr>
<td>≥50</td>
<td>25 (48.1)</td>
<td>17 (43.6)</td>
<td>8 (61.5)</td>
<td>NS</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12 (23.1)</td>
<td>9 (23.1)</td>
<td>3 (23.1)</td>
<td>NS</td>
</tr>
<tr>
<td>No</td>
<td>40 (76.9)</td>
<td>30 (76.9)</td>
<td>10 (76.9)</td>
<td>NS</td>
</tr>
<tr>
<td>T classification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>31 (59.6)</td>
<td>26 (67.1)</td>
<td>5 (38.5)</td>
<td>NS</td>
</tr>
<tr>
<td>T2</td>
<td>11 (21.2)</td>
<td>9 (23.1)</td>
<td>2 (15.4)</td>
<td>NS</td>
</tr>
<tr>
<td>T3</td>
<td>8 (15.4)</td>
<td>5 (12.8)</td>
<td>3 (23.1)</td>
<td>NS</td>
</tr>
<tr>
<td>Histology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well differentiated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorly differentiated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-flap group vs flap group</td>
<td>12 (30.8%) vs 7 (53.8%)</td>
<td>9 (23.1%) vs 3 (23.1%)</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Details of postoperative complications

<table>
<thead>
<tr>
<th>Type of complication</th>
<th>Non-flap (n = 39)</th>
<th>Flap (n = 13)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major complications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharyngocutaneous fistula*</td>
<td>12 (30.8%)</td>
<td>7 (53.8%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of skin</td>
<td>11 (28.2%)</td>
<td>5 (38.5%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of flap</td>
<td>5 (12.8%)</td>
<td>2 (15.4%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of jejunum</td>
<td>5 (12.8%)</td>
<td>2 (15.4%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of trachea</td>
<td>3 (7.7%)</td>
<td>1 (7.7%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of lymph nodes</td>
<td>4 (10.3%)</td>
<td>2 (15.4%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of flap</td>
<td>5 (12.8%)</td>
<td>2 (15.4%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of jejunum</td>
<td>5 (12.8%)</td>
<td>2 (15.4%)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of lung</td>
<td>1 (2.6%)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of trachea</td>
<td>1 (2.6%)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of lymph nodes</td>
<td>1 (2.6%)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of flap</td>
<td>1 (2.6%)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of jejunum</td>
<td>1 (2.6%)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of lung</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of flap</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of jejunum</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
<tr>
<td>Necrosis of lung</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>NS (0.057)</td>
</tr>
</tbody>
</table>

RESULTS

Table 1 shows the clinical and demographic characteristics of each group. Forty-nine men and three women were enrolled in this study. No significant differences were observed in terms of age, presence of DM, T classification, and tumor stage. Chemoradiation therapy at the primary treatment was higher in the flap group compared with that in the non-flap group (53.8% vs. 30.8%), but the difference was not significant. In addition, no significant differences were observed in the primary pathology, presence of neck dissection, and presence of paratracheal lymph node dissection. A significant difference was observed between the flap and non-flap group in relation to the presence of paratracheal lymph node dissection (P = 0.035). Table 2 shows the details of postoperative complications. Complications developed in 18 of 52 patients (34.6%). No significant difference in complication rate was observed between the flap and non-flap groups. A significant difference was observed in the frequency of hematoma, wound infection, necrosis of the trachea, necrosis of the jejunum, partial necrosis of the skin, and osteomyelitis; significantly frequent partial necrosis of the flap was observed in the flap group compared with the non-flap group (P = 0.003) in the flap group. In the non-flap group, it was observed in three patients (7.7%) in the non-flap group; however, this difference was not significant. Among the minor complications, no significant differences were observed between the groups in relation to the frequency of hematoma, wound infection, necrosis of the trachea, necrosis of the jejunum, partial necrosis of the skin, and osteomyelitis. Skin necrosis occurred in several cases.

Figure 1. coverage of PMCFs and DPFs.}

CONCLUSIONS

We performed suture closure using PMCFs or DPFs for high-risk patients who underwent TL or TPL, and successfully reduced the incidence of PCFs. Such preventive surgery should be considered for high-risk patients in the future. We believe that skin suture closure should be performed when necessary, taking into account the criteria presented by us for flap coverage and operative findings.