GLOVE PERFORATIONS DURING ORAL & MAXILLOFACIAL SURGICAL PROCEDURES

MAJID KHAN
P RAMSAY-BAGG

ABSTRACT

The purpose of this study was to examine the incidence of glove puncture in oral & maxillofacial surgical procedures.

A total of 612 gloves were collected after various maxillofacial surgical procedures and tested with water inflation method and 100 unused gloves were tested as controls.

Seventy nine (13%) punctures were identified in 612 gloves. Gloves from the left hand showed the highest incidence of punctures. No puncture was observed in 100 gloves tested as a control. The results showed that glove puncture was more likely to occur in gloves worn on left (nonworking) hand overall as compared with gloves from the right hand. Gloves used for surgical procedures in which wires were used showed the highest incidence of perforation and the incidence of unknown perforation were also very high (65.80%), additional precautions may therefore be indicated.

INTRODUCTION

The invasive nature of surgery, with its increased exposure to blood, means that during surgery there is a high risk of transfer of pathogens. Pathogens can be transferred through contact between patients and the surgical team, resulting in post-operative or blood borne infections in patients or blood born infections in the surgical team. Both patients and the surgical team need to be protected from this risk. This risk can be reduced by implementing protective barriers such as wearing surgical gloves. However, gloves can become perforated and their protective function is then compromised. Perforation usually occurs as a result of injuries from sharps, such as wires, sutures, instruments, bone fragments and also through natural wear and tear.

It may be considered that some maxillofacial surgical procedures carry greater risk of glove puncture than others, a study of the incidence of glove puncture during different maxillofacial procedures would appear to be appropriate. The results of such work may help to identify particular procedures which are associated with a high risk of glove puncture and thereby assist in limiting the risk of infection, especially those in high risk group.

Furthermore, the results of such investigations may help to rationalise the need for double gloving, perforation indicator systems in certain cases.

Aims and Objectives

• To identify glove punctures in oral and maxillofacial procedures.
• To analyse these in relation to the type of procedures performed.
• To evaluate the topographical distribution of perforations in surgical gloves after surgical procedures.

METHODOLOGY

In this study Latex Biogel gloves were investigated. Over a period of 6 months 612 were collected from main operation theatre and out patient department. The following surgical procedures were included in the study

- Fractures of facial bones
- Osteotomy
- Cleft lip and palate
- Condylectomy
- Coronoidectomy and costochondral graft
- Salivary gland surgery
- Extractions
- Surgical removal of wisdom teeth
- Apicectomy

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Glove perforation during oral & maxillofacial surgical procedures

- Biopsy and removal of soft tissue lesions
- Incision and drainage of abscess
- Enucleation of cyst
- Cryotherapy
- Arthrocentesis
- Oroantral fistula.

Gloves were tested for punctures by Water Inflation method, filling gloves with 0.5L of water, applying gentle pressure and observing for punctures for 20 seconds. The numbers of punctures were noted with their position being marked on a chart. By this method it was possible to determine the number and position of punctures in used gloves. As a control, 100 unused gloves were also inflated as above and tested for defects, in which no punctures were identified.

RESULTS

A total of 612 gloves were collected including both the surgeons (336) and the assistants (276) in whom 67 gloves were punctured (11%) while the total numbers of punctures were 79 (13%).

- Number of punctures: 79 (13%)
  - Single puncture: 56
  - Double punctures: 10
  - Triple punctures: 1

Two hundred sixteen gloves were used in procedures in which wires were used (fractures, osteotomy) in which 55 punctures were identified (25.5%). Patients in whom wires were used

Gloves used: 216

Punctures: 55 (25.5%)

Out of 612 gloves, 313 were used on the left hand, 299 on the right hand. When the gloves worn on the right hands were examined, 27 punctures were identified (9.03%). In contrast 52 punctures were found on the left hand (16.6%). (Table 1). All surgeons and assistants with punctures were right handed.

The results show that for a right handed surgeon index finger and thumb of the left hand are more vulnerable to puncture (Table 2). Out of 79 punctures 27 were known punctures and 52 were known after the water inflation test. Four punctures were false positive (Table 3). This study shows that puncture rate is higher in osteotomies followed by fractures and dentoalveolar surgery (Table 4). Positions of glove punctures are shown in Fig 2.

<table>
<thead>
<tr>
<th>Number of Gloves</th>
<th>Number of Punctures</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Hand</td>
<td>313</td>
<td>52</td>
</tr>
<tr>
<td>Right Hand</td>
<td>299</td>
<td>27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Right hand</th>
<th>Left hand</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb</td>
<td>4</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Index</td>
<td>10</td>
<td>19</td>
<td>29</td>
</tr>
<tr>
<td>Middle</td>
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</tr>
<tr>
<td>Ring</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Little</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Palm</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Dorsum</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>27(34.2%)</td>
<td>52(65.8%)</td>
<td>79</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Sur-</th>
<th>Assis-</th>
<th>Total</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Known during surgery fl</td>
<td>21</td>
<td>6</td>
<td>27</td>
</tr>
<tr>
<td>Known after inflation test</td>
<td>37</td>
<td>15</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>21</td>
<td>79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sur-</th>
<th>Assis-</th>
<th>Total</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Osteotomy</td>
<td>27</td>
<td>10</td>
<td>37</td>
</tr>
<tr>
<td>Fractures</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Dentoalveolar surgery</td>
<td>13</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Coronoidectomy</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Bone grafting</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lip lesion</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>21</td>
<td>79</td>
</tr>
</tbody>
</table>
DISCUSSION

The results of the present study indicate that surgical procedures in which wires are used places the surgeon and assistant at greatest risk to glove puncture, the nonworking hand is particularly at risk. This confirms the results of previous work that indicated that the left hand, especially the index finger, was particularly vulnerable for right handed surgeons.1,2 The gloves on the left hand (non-dominant) were also found to be significantly more at risk to puncture overall as compared with the right hand. Glove perforations were most commonly found on the index finger and thumb of the non-dominant hand, and then in decreasing order: palm, back of the hand and other fingers. These injury sites are not unexpected, as the non-dominant hand is often used to reposition or reach for needles/wires, hold tissue being cut or sutured, or used as a retractor to protect adjacent tissues during cutting or suturing.

This study also shows that the unknown perforation rate was 65.80% which is lower than the previous study in which perforation during the treatment of mandibular fractures is greater than 50%, with over 90% undetected at the time of surgery.3 This may be of particular relevance during treatment of a patient considered to be at high risk to blood borne infection. The results of present study indicate that the surgeon may be prudent to consider measures such as double gloving in procedures in which wires are used. Double gloving has been shown to improve protection against contamination of the surgeon’s skin with patient’s tissue and fluids.4 However, this additional protection must be balanced by the surgeon against the potential reduction in manual dexterity and possible discomfort. Several studies have shown that double gloving reduces the incidence of inner glove perforation during general surgery, trauma, and orthopaedic surgery.4,5,6,7 A system for identifying intra-operative glove perforations has also proved useful.6 A study was carried out to investigate double gloving and a glove perforation indication system in maxillofacial trauma surgery, which shows that the outer glove perforation rate was significantly higher than the inner glove. There were fewer unnoticed perforations in the glove perforation indication group than the standard surgical glove group (19% compared with 79%).7 Although double gloving may not prevent a penetrating injuries, it does increase the penetrating force required8 and may also confer additional protection because of “wipe off “effect of two glove layers.9

The results of present study indicate that the risk of glove puncture during maxillofacial surgical procedures is considerable. The results of previous studies show that perforation rate during a variety of minor dental and oral surgical procedures has ranged from 4.1% to 16%.10-12 The highest rate was associated with oral surgical procedures.11

Comparative studies from other specialised areas also show high rates of glove perforations. In abdominal surgical operations, operators sustain glove perforations in 35% to 54% of cases depending on the duration of operation13,14, in otolaryngology/head and neck surgery 25%,15, in dermatological operations 11.6%,16 and in gynaecological operations perforations were detected in 43% of the glove examined.17
CONCLUSION

Glove puncture during oral and maxillofacial surgical procedures has been assessed and the results indicated that the highest risk to glove puncture occurs to the nonworking hand specifically in those procedures in which wires were used, additional precautions may therefore be indicated.

REFERENCES


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