CLEAVAGE LINES IN THE ORAL MUCOSA OF JAPANESE CADAVERS

BY

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ABSTRACT

The cleavage lines of the skin have been variously called Langer's lines, cleavage lines, and Dupuytren's lines. These names indicate the fact that when an attempt is made to open a round hole in the skin, instead of a round hole a split occurs like the crevasses in a snow field or a glacier.

With the conviction that such lines could be found also in the oral mucosa, the mucosa of the palate, cheeks, and floor of the mouth were examined in Japanese cadavers, using the same methods as are used for similar experiments on the skin. Using an awl round in cross section and conical at the tip, the mucosa was pierced and the piercings were stained with black ink. As a result, cleavage lines appeared in the same way as in the skin and these were named provisionally "Mucosal cleavage lines".

INTRODUCTION

Since Langer in 1861 published his work1) on the cleavage lines of the skin, these lines have been presented in both Japanese and foreign surgical texts as indicating directions in which to cut the skin. However, there is no clear description of cleavage lines in the skin of the mouth region. We undertook to study these lines in Japanese cadavers, and were able to make some new discoveries3). Since cleavage lines were found in the lips, we reasoned that such lines could be found also in the oral mucosa. Using the same methods as previously, we attempted to discover the cleavage lines in the oral mucosa of Japanese cadavers.

MATERIALS

As shown in Table 1, the cadavers of five males and one female were used. It was determined, by a study of the cause of death and by direct observation, that there were no defects in the oral mucosa of these cadavers.

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Table 1. Cadavers

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Cause of death</th>
</tr>
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<tbody>
<tr>
<td>1078</td>
<td>Female</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>1086</td>
<td>Male</td>
<td>70</td>
<td>Cardiac asthma</td>
</tr>
<tr>
<td>1087</td>
<td>Male</td>
<td>84</td>
<td>Apoplexy</td>
</tr>
<tr>
<td>1088</td>
<td>Male</td>
<td>67</td>
<td>Unknown</td>
</tr>
<tr>
<td>1089</td>
<td>Male</td>
<td>87</td>
<td>Cardiac asthma</td>
</tr>
<tr>
<td>1090</td>
<td>Male</td>
<td>72</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

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Fig. 1. The awl selected to pierce the mucosa.

METHODS

We used a commercially available awl, round in cross section and with a conical tip, of the dimensions shown in Fig. 1. The heads were sectioned sagittally, as shown in Fig. 2, and the mucosa of the palate (1), the cheek (2), and the floor of the mouth (3) were pierced a large number of times in a random pattern. Black ink was applied to make the piercings stand out, and each preparation was photographed under identical conditions.

OBSERVATIONS

For each of the three areas studied, a composite diagram was prepared showing the cleavage lines of all six cases superimposed. These diagrams were compared with the photographs of the same areas, and the following observations were made.

1. Palatal mucosa

   Fig. 3 shows one example of the area marked (1) in Fig. 2. Fig. 4 is the composite diagram of all cases.

   In the anterior medial area of the hard palate no clear lines of cleavage could be discerned. Only small round holes appeared. Sometimes cracks
in the mucosa like crevasses in a snow field or glacier could be seen. These crevasses, that is, the tearing of the tissue along the cleavage lines, were more or less parallel to the sagittal plane. In the central and posterior areas along the medial line, more cleavage lines were apparent than anteriorly, and they were parallel to the sagittal plane. However, as one progressed laterally from the medial line the direction of the lines changed, so that they formed a dome shape in the composite. Laterally along the dental ridge the lines again ran parallel to the sagittal plane.

Medially in the soft palate the lines were along the sagittal plane in the anterior area, and along the frontal plane in the posterior area. Laterally the lines were more or less parallel to the frontal plane both anteriorly and posteriorly. On the uvula the lines were parallel to the frontal plane, as shown in Fig. 5.
Fig. 3. Cleavage lines in the mucosa of the palate.

Fig. 4. Diagram of cleavage lines in the mucosa of the palate.
Fig. 5. Cleavage lines on the uvula.

Fig. 6. Cleavage lines in the mucosa of the cheek.
2. The cheek mucosa

Fig. 6 shows one example, and Fig. 7 shows the composite diagram. The cleavage lines ran in an elliptical pattern centered on the corner of the mouth. However, in the area of the lips lines radiating away from the corner of the mouth were mixed with lines running concentrically to the corner of the mouth.

3. Mucosa of the floor of the mouth

One example is shown in Fig. 8, and the composite diagram in Fig. 9. The cleavage lines in the mucosa of the floor of the mouth were clear and easy to distinguish, and all ran parallel to the sagittal plane.

![Diagram of cleavage lines in the mucosa of the cheek.](image)

**RESULTS AND DISCUSSION**

The cleavage lines of the skin have been variously called Langer's lines, cleavage lines, and Dupuytren's lines\(^3-8\). These names indicate the fact that when an attempt is made to open a round hole in the skin, instead of a round hole a split occurs like the crevasses in a snow field or a glacier.

With the conviction that such lines could be found also in the oral mucosa, we experimented with the mucosa of the palate, cheeks, and floor
Fig. 8. Cleavage lines in the mucosa of the floor of the mouth.

Fig. 9. Diagram of cleavage lines in the mucosa of the floor of the mouth.
of the mouth in Japanese cadavers, using the same methods as are used for similar experiments on the skin. Using an awl round in cross section and conical at the tip, we pierced the mucosa and stained the piercings with black ink. As a result, cleavage lines appeared in the same way as in the skin. We have named these provisionally "mucosal cleavage lines."

With the exception of the anterior medial part of the hard palate, the direction of the mucosal cleavage lines showed a clear orientation, and we have shown this with photographs and composite diagrams. In the anterior medial part of the hard palate only round holes appeared with little tendency to split in any one particular direction.

The orientation of the cleavage lines in the skin is said to be parallel to the collagen and elastic fibers of the dermis and subdermal tissue\(^1\) and this seemed to be the case also in our observations\(^2\). A view has also been expressed that fibers in the skin run perpendicularly to the direction of tension of the skin\(^3\). In our experiments, the angle formed between the long axis of the cleavage lines and the underlying muscle fibers is different in each part of the body.

We have put off histological observations on the cleavage lines of the oral mucosa to another occasion. However, regardless of why and how such cleavage lines occur, the fact that we have been able to demonstrate the existence of cleavage lines in the oral mucosa as well as in the skin has a great significance in the field of oral surgery.

**Acknowledgement**

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**References**