Clinical Report

FLUID EXTRAVASATION OF THE ARTICULAR CAPSULE AS A COMPLICATION OF TEMPOROMANDIBULAR JOINT PUMPING AND PERFUSION

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Abstract

This report is a retrospective study of fluid extravasation as a complication of temporomandibular joint pumping and perfusion. Contrast-enhanced 3D-CT of the upper joint compartment was performed for presurgical diagnosis before temporomandibular joint arthroscopic surgery in our hospital from 1996 to 2000. From these cases, 43 joints and 38 patients were selected because they had not improved under conservative treatment during the previous six months. Fluid extravasation of the articular capsule was recognized in 9 joints (20.9%) in 9 patients, 3 males and 6 females. Two of the nine patients had undergone arthroscopic observation before surgery. This test had revealed only thin articular capsule, not a perforation, in any of these cases. The data indicate only extremely tiny perforations or infiltration leakage due to the fluid pressure in the upper joint compartment during pumping or perfusion. Oral and maxillofacial surgeons should be aware of this complication.

Key words: TMD—Fluid leakage of the capsule—Fluid extravasation of the capsule—Contrast-enhanced 3D-CT

INTRODUCTION

Recently, arthroscopic surgery and arthrocentesis of the temporomandibular joint (TMJ) have been widely used, and many surgeons have reported their utility. But, some surgeons have reported complications of arthroscopic surgery, including lateral pharyngeal edema.

We have previously reported our results with contrast-enhanced 3D-CT of the upper joint compartment, and we have sometimes recognized the extravasation of the contrast medium from the TMJ capsules. We report the rate of extravasation, the specifics of the regions, and the causes of this phenomenon.
PATIENTS AND METHODS

1. Patients

The contrast-enhanced 3D-CT of upper joint compartment was used to examine 43 joints in 38 patients between December of 1996 and April of 2000. The ages of the patients ranged from 16 to 79 years. All of them presented with closed lock and had not shown any improvement during the previous six or more months under conservative treatment.

2. Methods

For 3D-CT scanning, spiral CT data acquisition was employed with a slice width of 1 mm and a reconstruction width of 0.5 mm, 120 kVp Tube voltage, 150 mA Tube current using an X force SH Helical CT (Toshiba Medical Co.), CT values were set in the range of 2,000 Hounsfield Units (HU) to 4,095 HU and gained 3D image using X vigor 3D image processor (Toshiba Medical Co.). Onishi's method was adopted for contrast medium injection. The contrast medium was injected into the upper joint compartment of TMJ using a 23 gauge needle. An X-ray television system was used for confirming the technique. 3D reconstruction of the CT data was performed using X force SH (Toshiba Medical Co., Japan) and X Vigor (Toshiba Medical Co., Japan). The contrast medium was Optiray® 350 (Mallinckrodt Medical Co., USA). First, the contrast medium was infused until slight pressure was felt without pumping. Then, the contrasted image was obtained, permitting diagnosis of intra-articular status (Figs. 1, 2).

We investigated the extravasation of the articular capsule. In the retrospective study, arthroscopic observations has been made during arthroscopic surgery in two cases, according to the criteria for the surgery.

Fig. 1 Normal appearance of contrast-enhanced 3D-CT of the upper joint compartment

Fig. 2 Three dimensional view of the same case shown in Fig. 1
Table 1 Extravasation cases and regions

<table>
<thead>
<tr>
<th>Patient number</th>
<th>Gender</th>
<th>Age in years</th>
<th>Affected TMJ</th>
<th>Region of extravasation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>Female</td>
<td>55</td>
<td>Left</td>
<td>Anteromedial</td>
</tr>
<tr>
<td>2*</td>
<td>Female</td>
<td>25</td>
<td>Left</td>
<td>Anteromedial</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>57</td>
<td>Left</td>
<td>Lateral</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>26</td>
<td>Left</td>
<td>Medial</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>29</td>
<td>Right</td>
<td>Anteromedial</td>
</tr>
<tr>
<td>6</td>
<td>Female</td>
<td>46</td>
<td>Right</td>
<td>Anteromedial</td>
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<tr>
<td>9</td>
<td>Female</td>
<td>60</td>
<td>Left</td>
<td>Anteromedial</td>
</tr>
</tbody>
</table>

* Together with arthroscopic observation

![Fig. 3 Extravasation of contrasted medium at the outside of the anteromedial capsule of the upper joint space on the transverse CT.](image1)

![Fig. 4 A same case as Fig. 3; contrast-enhanced 3D-CT was made.](image2)

**RESULTS**

The numbers of patients and joints in whom we recognized extravasation of the articular capsule were 9 patients and 9 joints, 3 males and 6 females (Table 1). The rate of extravasation was 20.9%.

Next, we investigated the location of the extravasation and found that it most frequently occurred in the anteromedial region (6 cases), the lateral (2 cases), and the medial (1 case) (Figs. 3–10). Most of these cases of extravasation were recognized gradually during a 15 minute period.

Arthroscopic observation during arthroscopic surgery was applied to 2 of our 9 cases. We found that the anteromedial regions of the articular capsules were extremely thin in

![Fig. 5 Superior view of the upper joint space. Extravasation was recognized at the anteromedial region of the upper joint as the dark area. Wide adhesion was indicated by the lack of contrast medium in the intermediate and posterior portions of the upper joint space.](image3)
the upper joint compartments of both cases, but no perforation of the capsule could be detected (Figs. 11, 12). The fluid extravasation was absorbed over time without any treatment or influences on the function of temporomandibular joint. No lateral pharyngeal edema was experienced in this study.

DISCUSSION

Arthroscopic surgery\(^1,2,4,5,8,9\) or arthrocen-
tesis\(^3\) are often used to treat internal derange-
ment of TMJ. One complication of arthro-
scopic surgery is lateral pharyngeal edema\(^1,2,9\). Green and Van Sickel\(^1\) and White\(^9\) have reported that this kind of side effect occurs in 0.45–2% of arthroscopic surgeries. This is a low but still significant value, because a vast extravasation can cause the severe complica-
tion of obstructive airway.

However, the questions of how and where it will occur is not addressed in any current articles. Kakudo et al. has suggested that the causes of leakage during perfusion are the embolization of outflow needle and too much pumping pressure\(^2\). They did not mention any other possible causes.

We have sometimes recognized extravasa-
tion of contrasting medium during the pro-
cedure for insufflation and distention of upper joint compartment when we have used X-ray television and following contrast-enhanced 3D-CT. Most of these cases of extravasation developed gradually over 15 minutes. This pattern suggests that the leakage was not caused by a small perforation, but by diffusion.

Extravasation occurred most frequently in the anteromedial region. Furthermore, we found that it occurred in cases with severely thin articular capsules but with no perforation.
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that could be detected during arthroscopy. We think that a thin articular capsule is associated with extravasation and that pumping or perfusion pressure may cause a tiny perforation or infiltration leakage.

CONCLUSION

Among our total of 38 cases and 43 joints, extravasation was recognized in 9 joints (20.9%).

We found thin capsules in the anteromedial region of most of these articular capsules, and most of the leakage was also in this area. Perfusion pressure may cause a small perforation or leakage of the articular capsule.

These values are not low, so we must take care during the perfusion of arthroscopic surgery and arthrocentesis.

This is still a hypothesis, but there are no other explanations, and the subject requires further study.

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REFERENCES


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