

# Synovial Plicae and Temporomandibular Joint Disorders: Surgical Findings

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**Purpose:** Synovial plicae and their relation to pain and disability have been reported in the orthopedic literature in association with the knee and other extremity joints. However, the occurrence of synovial plicae in the temporomandibular joint (TMJ) have rarely been reported. This report describes the surgical appearance, distribution, and histologic findings of synovial plicae in patients with TMJ recurrent dislocation and internal derangement.

**Materials and Methods:** Twenty consecutive patients, 16 with recurrent dislocation and 4 with internal derangement, who underwent open TMJ surgery by the same surgeon from 2010 to 2013 were studied retrospectively.

**Results:** Synovial plicae were detected in 18 of 28 joints (64.3%). Synovial plicae were observed in 15 of 24 joints (62.5%) with recurrent dislocation and in 3 of 4 joints (75%) with internal derangement. Histologic findings of these plicae were consistent with dense fibrous or cartilaginous tissues, with some exhibiting a synovial lining.

**Conclusions:** Although the role of synovial plicae in TMJ disorders is unknown and unstudied, consideration should be given to investigating the possible relation of these structures to the signs and symptoms of TMJ disorders.

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*J Oral Maxillofac Surg* 73:827-833, 2015

In the orthopedic literature, symptomatic synovial plicae have been reported in the knee<sup>1-3</sup> and other extremity joints, such as the shoulder<sup>4</sup> and elbow.<sup>5</sup> Although the common signs and symptoms of impingement in the medial plica of the knee include crepitation, popping, snapping, instability, catching, and pain,<sup>1-3</sup> there is major crossover of symptoms and clinical findings associated with more commonly seen diagnoses.<sup>3</sup> Thus, the specific diagnosis of plica syndrome is controversial.<sup>1-3</sup> The anatomic occurrence and distribution of

plicae in orthopedic joints has been visualized on magnetic resonance imaging (MRI)<sup>2,3,5-7</sup>; however, MRI has not been able to distinguish between pathologic and nonpathologic plicae.<sup>6,7</sup> MRI findings can be useful to evaluate the thickness and extension of plica and synovitis with concomitant effusion.<sup>2,5-7</sup> The gold standard for a diagnosis of plicae in orthopedics is arthroscopy followed by excision.<sup>1-7</sup>

To date, in the literature on the temporomandibular joint (TMJ), only cadaveric studies showing the

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Received August 6 2014

Accepted December 17 2014

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0278-2391/14/01837-0

<http://dx.doi.org/10.1016/j.joms.2014.12.018>

presence, appearance, and histology of synovial plicae can be found.<sup>8-10</sup> However, there is little description related to the clinical appearance of synovial plicae in patients with TMJ disorders.<sup>11,12</sup> The purpose of this report is to describe the occurrence, distribution, and histologic findings of synovial plicae in patients who underwent open TMJ surgery for recurrent dislocation and internal derangement.

## Materials and Methods

Twenty consecutive patients, 16 patients with recurrent dislocation and 4 with internal derangement, who underwent open TMJ surgery from 2010 to 2013 were studied retrospectively. The diagnoses and surgical indications for patients with dislocations and internal derangement were based on criteria published by the American Association of Oral and Maxillofacial Surgeons.<sup>13</sup> Any patients with a diagnosis of TMJ pathology, such as neoplasm, hyperplasia, rheumatoid arthritis, loose body disease, or ankyloses, were not included. Surgery for recurrent dislocation involved eminectomy; however, 1 patient underwent open repositioning. Discectomy without a disc substitute was used in all internal derangement cases, but 1 patient underwent a discectomy with high condylectomy. All surgeries were performed by the same surgeon (K.M.).

The inclusion criteria for patients with internal derangement were nonreducible disc displacement (Wilkes stages III, IV, and V) confirmed by MRI and no response to nonsurgical treatment for at least 6 months. The exclusion criteria were patients whose condition could be managed by arthroscopy or arthrocentesis alone. In all cases, preoperative diagnostic imaging included orthopantomography and 1.5-T MRI with T1- and T2-weighted imaging in the sagittal plane in the closed and open jaw positions with or without coronal sections.

For patients with recurrent dislocation, the inclusion criteria were a history of repetitive dislocations for longer than 3 months and no response to nonsurgical treatment, such as a protective bandage, occlusal splint, and observation. Preoperative diagnostic imaging included orthopantomography or computed tomography. MRI was used only when the patient had a history of clicking or limited jaw opening.

Fourteen specimens of synovial plica were examined histologically by the department of surgical pathology at each hospital. Only 4 synovial plicae were documented in the surgical record owing to an earlier observation of fine or small plicae.

Because of the retrospective nature of this study, it was granted an exemption in writing by the institutional review boards of Ako City Hospital (Ako Japan), the Kyotango Kumihama City Hospital (Kyotango, Japan), and Kusatsu General Hospital (Kusatsu, Japan).

## Results

Seven male and 13 female patients 25 to 85 years old (mean, 59.45 yr) were included in the study. Twenty-eight joints (12 unilateral and 8 bilateral) underwent open surgery. Patients 6, 12, and 13 had a diagnosis of bilateral recurrent dislocation by history; however, at surgery, these dislocations were found to be unilateral (Table 1).

The average age of the 16 patients with TMJ dislocation was 63.2 years. This group consisted of 24 joints (8 unilateral and 8 bilateral). Signs and symptoms included condylar hypermobility with recurrent dislocations and 1 bilateral persistent dislocation. These patients reported pain only when their mandibles were dislocated. Eminectomy was performed in 15 patients, and 1 patient underwent bilateral discectomy and joint repositioning owing to persistent joint dislocation with the damaged disc.

Four patients (mean, 44.3 yr of age) had internal derangement (3 with Wilkes stage IV and 1 with Wilkes stage V). All underwent discectomy, but 1 patient also underwent high condylectomy because of a ruptured disc and a deformed condyle.

All these patients had signs and symptoms of internal derangement, limited mandibular opening with deviation to the affected side, and limited mandibular lateral and protrusive excursions. However, none had any atypical pain complaints that might be associated with entrapment of synovial plicae.

Synovial plicae were seen in 14 patients (18 of 28 total operated joints [64.3%]; Table 2). Fifteen synovial plicae were seen in 11 patients (mean, 68.1 yr old; 15 of 24 joints [62.5%]) with recurrent dislocation. Plicae were not detected in 5 patients (mean, 52.6 yr old). In 3 (mean, 42.6 yr old) of the 4 patients with closed-lock internal derangements (2 with Wilkes stage IV and 1 with stage V), synovial plicae were detected in 3 of 4 joints (75%).

At preoperative diagnostic imaging, there were no obvious specific findings relating to the presence of synovial plicae.

At surgery, the synovial plicae found were typically broad (Figs 1-3), meniscus-like (Fig 4), or tongue-like (Fig 5) in shape. Seven were tongue-like, 4 had a broad form, 1 had a meniscus-like and fringe-like shape, and the other 5 were amorphous in shape (Table 2). The plicae were broader in the dislocation than in the internal derangement group. Four broad plicae were found in 2 cases (patients 11 and 15); 1 meniscus-like plica (patient 5) and 1 fringe-like plica (patient 7) were detected only in the dislocation group. These plicae presented as relatively thick, wide, pliable areolar tissue lying within the lateral para-discal recess (groove) and intruding into the upper joint space (Fig 6A-C). No obvious differences in the form and shape of fine

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