Time interval from initial surgery for torn discoid lateral meniscus to the contralateral knee surgery

Takahisa Sasho a,*, Hiroaki Tsuruoka b, Masahiko Saito a, Ryuichiro Akagi a, Yuta Muramatsu a, Shunsuke Mukoyama a, Satoshi Yamaguchi a

a Department of Orthopaedic Surgery, Graduate School of Medicine, Chiba University, Chiba, Japan
b Department of Orthopaedic Surgery, Chiba Rehabilitation Center, Chiba, Japan

Received 29 June 2012; accepted 25 September 2012
Available online 29 January 2014

Abstract
To estimate the long-term possibility of needing surgery on contralateral knees that were asymptomatic at the time of initial discoid lateral menisci (DLM) surgeries, a minimum of 10 years of follow-up was performed after unilateral surgery for a torn DLM. Eligible patients had received arthroscopic meniscectomy between 1986 and 2001 for unilateral torn DLM. Patients with symptomatic contralateral knees at the time of initial surgery were excluded. Among these patients, only those aged no more than 20 years at the time of surgery were included in the study. Ultimately, 30 contralateral knees were followed for an average of 16.6 years after the initial knee surgery. Types of menisci were examined from operative records employing Watanabe’s classification. When surgical treatment was necessary on contralateral knee, time interval from initial surgery to the second surgery was recorded. Patients were divided into two groups: those who needed surgical treatment on their contralateral knees (surgery group: S group) and those who did not need surgical treatment on their contralateral knees (non-surgery group: N group). Age at the time of initial surgery, sex, and type of menisci were examined and compared between the two groups. Seven of the 30 knees received arthroscopic surgery during the follow-up period (at an average of 1.6 years after the initial surgery). The rest of the 77% of contralateral knees survived a follow-up period of at least 10 years without requiring surgery. A higher percentage of female patients needed contralateral knee surgeries (30%, 6/20 patients) compared with male patients (10%, 1/10 patients). The possibility for needing surgery on the contralateral knee was highest in the first 2 years and decreased drastically thereafter.

Keywords: Discoid lateral meniscus; Contralateral knee; Meniscectomy; Prognosis

Introduction
Symptomatic discoid lateral menisci (DLM) often need surgical treatments. DLM are considered to be more vulnerable to injuries compared with normally shaped lateral menisci, but the actual degree of risk for asymptomatic DLM is poorly understood. DLM exist bilaterally in a high percentage of patients and several publications have referred to this bilaterality, suggesting that contralateral knees might become symptomatic that require later surgical treatments even when they are asymptomatic at the time of surgery on the symptomatic knee. It is notable that recent long-term clinical follow-up studies usually included some percentage of subjects who had undergone bilateral surgeries. However, none of these publications detailed the timing of the surgery on the contralateral knees. To address this, we evaluated the status of contralateral knees by a long-term follow-up study. For that purpose, contralateral knees that were asymptomatic...
at the time of initial DLM surgeries were clinically followed for a minimum of 10 years after unilateral surgery for a torn DLM.

We hypothesized that there should be a specific time range where contralateral knees became symptomatic as to need surgical treatment. By elucidating this timing, we might be able to avoid contralateral knee surgeries by modulating postoperative activities.

Materials & methods

Patients

Eligible patients had received arthroscopic meniscectomy between 1986 and 2001 for unilateral torn DLM. We performed surgery when a knee exhibited locking symptoms and extension loss, or when joint effusion or pain upon recreational activities persisted for more than 3 months. In addition, only cases with torn DLM diagnosed by preoperative magnetic resonance imaging (MRI) were considered eligible for arthroscopic surgeries. Subjects included in the present study were those who had torn DLM confirmed by preoperative MRI as well as intraoperative findings. Among these patients, to minimize the degenerative factor of menisci, only patients aged ≤20 years at the time of surgery were included because degeneration of menisci starts in the thirties.11 Patients with symptomatic contralateral knees at the time of initial surgery were excluded. A total of 75 DLM surgeries were performed during this period. Three patients received simultaneous bilateral surgeries. Twenty-two patients were over 20 years of age, and six patients had symptoms on their contralateral knee when initial surgeries were performed. Thus, 41 patients met the inclusion criteria, but we could not reach nine patients due to them having moved, and two patients declined to participate in the study. Finally, 30 patients were left for the present study. Twenty patients were female and 10 were male. The average age at the time of initial surgery was 11.9 years (range: 3–19 years). The average follow-up period after surgery was 16.6 ± 4.6 years (range: 10.0–25.1 years).

Items examined

Time from the occurrence of the symptom to the surgery on the index operated knees was examined. Preoperative activity level employing Tegner’s score before initial surgery and highest activity level in life time was examined. When surgical treatment was necessary on contralateral knee, time interval from initial surgery to the second surgery was recorded.

Type of menisci was classified based on operative records according to Watanabe’s classification, whereby DLMs were classified as incomplete, complete, and Wrisberg type based on the degree of coverage of the tibial plateau and the presence or absence of the normal posterior attachment.12 Patients were divided into two groups: those who needed surgical treatment on their contralateral knees (surgery group: S group) and those who did not need surgical treatment on their contralateral knees (non-surgery group: N group).

Statistical analyses

Variables evaluated included sex, age, type of menisci, and the time from the initial surgery to the contralateral surgery.

The Kaplan-Meier method was employed for survival analysis of the contralateral knee, with failure defined as the time when the contralateral knee, with failure defined as the time when the contralateral knee became symptomatic as to need surgical treatment. Variables analyzed included sex, age, type of menisci, and the time from the initial surgery to the contralateral surgery.

Results

Patients’ features

As for initial knee surgery, seven patients received surgery within a week due to acute locking symptom. For the other 23 patients, average time from occurrence of symptom to the index surgery was 12.4 ± 19.2 (4–80 months).

Average preoperative Tegner activity score was 3.7 ± 0.9. Twenty-one menisci were complete discoid meniscus (CDM), and nine menisci were incomplete discoid meniscus (ICDM). None was classified as Wrisberg type.

Timing and percentage of contralateral surgery

Seven patients (23.3%) received arthroscopic surgery on the contralateral knee because of a torn DLM. No knees received arthroscopic surgery because of other reasons. The average age at the time of contralateral knee surgery was 15.4 ± 4.2 years (range: 8.3–20.7 years); one patient was over the age of 20 years.

The average time from the initial surgery to contralateral knee surgery was 1.6 ± 1.3 years (range: 0.2 to 4.1 years). Six of the seven contralateral surgeries occurred within 2 years of the initial surgery (Fig. 1).

Demographic characteristics of the S and N groups

At the time of the initial surgery, the average age of patients who later needed surgical treatment on the contralateral knee (S group, n = 7) was 12.4 ± 2.3 years, and that of patients who did not need surgery (N group, n = 23) was 11.7 ± 4.7 years (Table 1). A higher percentage of female patients needed contralateral knee surgeries (30%, 6/20 patients) compared

Fig. 1. Survivorship of contralateral knees. Risk of needing surgical treatment for the contralateral knee was high within the first 2 years after the initial surgery. After 2 years, the risk decreased drastically.
with male patients (10%, 1/10 patients). Average preoperative Tegner’s score was 3.6 ± 1.0 for the N group and 3.7 ± 0.8 for the S group. Highest Tegner’s score of lifetime was 5.0 ± 0.8 for the N group (Table 1).

Among the seven menisci that needed surgical treatment, five were CDM and two were ICDM. Combinations of bilaterally treated knees were five CDM/CDMs and two ICDM/ICDMs. In the N group, 16 menisci were CDM and seven were ICDM (Table 1).

Discussion

Prior to our study, the time from initial knee surgery to contralateral knee surgery had not been detailed in publications. We hypothesized that there should be a specific time range where contralateral knees became symptomatic as to need surgical treatment. As a result, we found that seven of 30 contralateral knees (23.3%) required surgery and that six of seven contralateral operations were performed within 2 years of the initial surgery. After this period, 77% of contralateral knees did not require surgical treatment over long-term observation. So the risk of needing surgical treatment on the knees did not require surgical treatment over long-term of the initial surgery. After this period, 77% of contralateral knees became symptomatic as to need surgical treatment. As a result, we found that seven of 30 contralateral knees became symptomatic as to need surgical treatment.

DLM are considered to be more vulnerable to injuries compared with normally shaped lateral menisci. Rohren et al. reported that 20% of DLM have tear on MRI and that is twice as normal lateral menisci. But the actual possibility for DLM to be torn is not fully understood. When a knee needed surgical treatment because of a symptomatic torn DLM, the contralateral knee was assumed to be relatively at high risk for requiring surgery since this knee was exposed to almost the same factors that caused the initial DLM to become torn and symptomatic. Those factors might include age, sports activities, and sex.

In fact, mid- to long-term follow-up studies (average follow-up period of 32 months to 16 years) included approximately 10–20% of cases having bilateral surgery. However, the fate of contralateral knees in terms of necessity for future surgical treatment remains unclear, and needs to be examined and discussed with patients receiving surgeries for torn DLM. Our finding made us think that there might be a specific period when DLM are fragile and thus susceptible to mechanical stress. We speculate that this fragility might be due to internal factors such as matrix composition or vascularity of adolescent DLM, or due to external factors such as the daily activities of adolescents. Unfortunately, we could not tell which could be a primary factor. A higher percentage of female patients tended to need contralateral knee surgeries (30%, 6/20 patients) compared with male patients (10%, 1/10 patients), but due to the small number of the subjects we could not tell if sex affects the percentage of contralateral knee surgeries.

As high sports activity is a risk factor for meniscal injury, special care might need to diminish operative treatment in this period. After this period, high sports activity did not appear to be a risk for surgery because highest Tegner’s score of the N group indicated higher score than that of preoperative ones.

Kato et al. reported data from 306 Japanese cadavers (female: male = 145:161), indicating that 18% of menisci of the contralateral knees were normally shaped when the other knees were CDM or ICD. These researchers also reported that more than 70% of ICDM/CDM were intact in cadavers averaging 77.15 years of age at death (range: 42–103 years). Considering that the majority of ICDM/CDMs were intact and that nearly 30% of cadaveric ICDM/CDM were torn but presumably did not need surgical treatments, it appears that most DLM can survive life-long either without symptoms or with only limited symptoms. On the other hand, Ahn et al. reported in their MRI study that 32 out of 33 contralateral knees were DLM among unilateral surgical cases for DLM and that mean Lysholm Score of contralateral knees was 93.6 and that more than half of these knees had symptoms, though they only dealt with data from male soldiers.

Although our study had a long follow-up period (mean of 16.6 years), the average age of patients upon final evaluation was only 28.5 years. Thus, further follow-up would be necessary to know the ultimate fate of the contralateral knee. However, our findings indicate that after 2 years from initial surgery or after the age of 20 years, the chance of the contralateral knee becoming symptomatic as to need surgical treatment lessens considerably. This finding appeared to be in line with the previously published follow-up reports; percentage of bilateral cases included in follow-up studies did not differ between long-term and mid-term follow-up studies. Two out of 27 (7.4%) cases and five out of 37 (13.5%) cases were bilateral surgical cases in more than a mean 14 years of follow-up and 10.3–21.4% were bilateral cases in averages of 51- to 54-month studies.

Many reports have described symptomatic DLM in children and adolescents, however, Wong et al. recently reported that symptomatic DLM can occur at any age. It is notable that Nawata et al. reported symptomatic DLM in patients over the age of 40 years, with no patients having previous symptoms. Thus, our patients might reach another risk point at middle age or older when degeneration of menisci might be causative.

The type of surgeries included in our study likely had an impact on the outcome. As mentioned in material and method section, we did not perform surgery in cases where DLM were found coincidentally upon MRI examination.

Our study had two limitations. Firstly, MRI examinations were not performed for contralateral knees not undergoing

<table>
<thead>
<tr>
<th>Sex</th>
<th>S group (n = 7)</th>
<th>N group (n = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y/o)</td>
<td>12.4 ± 2.3</td>
<td>11.7 ± 4.7</td>
</tr>
<tr>
<td>Type of DLM</td>
<td>CDM: 5</td>
<td>CDM: 16</td>
</tr>
<tr>
<td></td>
<td>ICDM: 2</td>
<td>ICDM: 7</td>
</tr>
<tr>
<td>Tegner’s score (pre-op)</td>
<td>3.7 ± 0.8</td>
<td>3.7 ± 1.0</td>
</tr>
<tr>
<td>Highest Tegner’s score</td>
<td>Not applicable</td>
<td>5.0 ± 0.8</td>
</tr>
</tbody>
</table>

Table 1
Demographic characteristics of the surgery (S) and non-surgery (N) groups.
surgery (N group), which might underestimate percentage of contralateral knee surgeries of DLM. Lack of MRI might cause overlooking asymptomatic torn DLM as well. Secondly, the number of patients included in our study might be too small to allow for definitive conclusions; however, our patient population was one of the largest long-term follow-up studies.

Conclusions

Twenty-three percent of contralateral knees needed surgical treatments during a follow-up period of more than 10 years (mean, 16.6 years) after the initial surgery for torn DLM. Most of the surgeries were performed within 2 years after initial surgery.

Conflicts of interest

The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

References