

# Prevalence of Chondral Lesions in Knee Arthroscopy

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## ABSTRACT

**Background:** Chondral and osteochondral injuries of the knee joint are undervalued in subjects undergoing orthopedic surgery. Chondral lesions are difficult to diagnose as they do not present specific clinical signs. The objective of the study was to establish the prevalence of cartilage injuries in patients undergoing arthroscopy of the knee for knee pain or instability. **Materials and methods:** A retrospective study was conducted on 355 consecutive knee arthroscopies. Chondral lesions were found in 247 (69.6%) cases. Regarding their location, chondral lesions were more likely to be located on the medial femoral condyle (53.8%), while lesions on the lateral femoral condyle alone (0.8%) were the least frequent ones. Chondral injuries were frequently found with associated articular findings such as meniscal lesions (56.68%) and anterior cruciate ligament tears (2.84%) or both menisci and anterior cruciate ligament tear (15.38%). The ICRS grade II cartilage lesions were most frequently diagnosed (56.3%) while grade IV was the least frequent type (6.9%). **Conclusions:** Chondral damage is frequently diagnosed during knee arthroscopy, present in more than 50% of the arthroscopies performed for various indications, and an important part of cartilage injuries were linked with other intraarticular findings, such as anterior cruciate ligament tear and medial meniscus tear.

**Keywords:** chondral injury, knee arthroscopy, ICRS classification

## INTRODUCTION

Chondral and osteochondral damage is frequently encountered in current orthopedic clinical practice. The articular chondral tissue is an extremely specialized type of connective tissue of the diarthrodial joints that facilitates the transmission of loads with a low frictional coefficient, but with a limited capacity to regenerate, even following minor injuries.<sup>1-3</sup> It also provides a smooth, lubricated surface for the articulation with a low-friction gliding surface, which none of the artificial constructs have been able to substitute with success.<sup>4</sup>

The clinical signs of chondral injuries have low specificity and predictive capacity, thus making their diagnosis difficult to achieve. Subjects who present

chondral damage might present symptoms that are more specific to meniscal lesions. However, if left untreated, cartilage lesions of the knee can cause premature arthritis and can lead to impaired joint function and decreased quality of life.<sup>3,4</sup>

Being an accurate diagnostic and treatment method for disorders of the knee joint, the minimally invasive arthroscopy has become the gold standard procedure for investigation of the knee, with a diagnostic specificity of over 90%.<sup>3,5</sup>

Damage of the chondral tissue in the joints is an underestimated issue in subjects who undergo orthopedic surgery for various conditions. Current data states that there is a proved incidence of 60 to 66 percent of cartilage injuries discovered during knee arthroscopies, regardless of the surgical indication.<sup>6-9</sup>

The aim of the study was to establish the prevalence, the type, and the localization of cartilage injuries in patients undergoing arthroscopy of the knee and to establish what their relationship is to other injuries.

## MATERIALS AND METHODS

We conducted a retrospective observational study on 444 consecutive knee arthroscopies performed between 2014 and 2016, in the "Ovidiu" Clinical Hospital, Constanța, Romania.

The approval of the institutional review committee of the private hospital where the procedures had been conducted was obtained prior to the conduction of the study. Patient data was obtained from the medical files of the enrolled study subjects.

The inclusion criteria consisted in patients who underwent arthroscopy of the knee for painful knee joint, and with impaired articular function, loose body sensation, meniscal tears, or anterior cruciate ligament reconstruction.

The exclusion criteria consisted in the presence of prior major knee injury, inflammatory arthritis or infectious arthritis in the medical history of the patients, as well as subjects aged under 18 years or over 60 years.

**TABLE 1.** Patient distribution according to age

Age group (years)	Incidence (n)	%
Under 30	70	19.7
31–40	84	23.7
41–50	105	29.6
51–60	96	27.0
TOTAL	355	100.0

The arthroscopies were conducted by two surgeons specialized in orthopedics and trauma, with an experience in practicing arthroscopic surgery for a minimum of 5 years. We extracted data concerning chondral damage (grade, site, status of adjacent chondral tissue), associated joint damage, as well as information on the surgical procedure, as they were noted after each arthroscopy in patient records by the operating surgeon. The grade of the lesion was assessed according to the International Cartilage Repair Society (ICRS) classification system.<sup>10</sup>

The data were collected from patients' medical files and were processed using Microsoft Excel and SPSS Statistics version 17.0 (IBM, New York, USA). Statistical analysis included frequencies, cross-tabs, and associations of the studied variables. Those associations were tested using likelihood ratio and a significance level of 0.05.

## RESULTS

A total of 444 consecutive knee arthroscopies performed between 2014 and 2016 were analyzed, and 355 patients were enrolled in the study as they did not present any of the major exclusion criteria. The mean age of the study population was  $42.19 \pm 11.68$  years, ranging between 18–60 years, as presented in Table 1.

Chondral lesions were found in 247 (69.6%) cases, and their frequency increased with age ( $p < 0.001$ ) (Table 2).

Regarding their location, chondral injuries were more frequent at the level of the medial femoral condyle (53.8%), while lesions on the lateral femoral condyle alone (0.8%) were the least frequent ones (Table 3).

**TABLE 2.** The distribution of chondral lesions according to age

	Under 30 n (%)	31–40 n (%)	41–50 n (%)	51–60 n (%)
Without chondral lesions	57 (81.42%)	42 (50%)	9 (8.57%)	0 (0%)
With chondral lesions	13 (18.57%)	42 (50%)	96 (91.42%)	96 (100%)
Total	70	84	105	96

**TABLE 3.** Anatomical distribution of chondral lesions

Location	Incidence (n)	%
Medial femoral condyle	133	53.8
Lateral femoral condyle	2	0.8
Patellae	24	9.7
Medial + lateral femoral condyle	24	9.7
Medial femoral condyle + trochlea	3	1.2
Medial femoral condyle + patellae	38	15.4
Medial + lateral femoral condyle + patellae	4	1.6
Medial + lateral femoral condyle + patellae + trochlea	2	0.8
Lateral femoral condyle + patellae	2	0.8
Patellae + trochlea	3	1.2
Medial femoral condyle + trochlea + patellae	12	4.9
TOTAL	247	100.0

**TABLE 4.** Distribution of other concomitant arthroscopic findings

	Incidence (n)	%
Chondral lesions alone	62	25.10
Chondral lesions + meniscal injury	140	56.68
Chondral lesions + anterior cruciate ligament tear	7	2.84
Chondral lesions + both	38	15.38
TOTAL	247	100.0

Chondral injuries were frequently associated with other joint injuries, such as meniscus lesions (56.68%) and anterior cruciate ligament tear (2.84%), or both menisci and anterior cruciate ligament tear (15.38%). The distribution of other concomitant arthroscopic findings is shown in Table 4.

Grade II according to the ICRS classification system was the most frequent grade of cartilage injury (56.3%), while grade IV was the least frequent one (6.9%) ( $p < 0.001$ ) (Table 5).

## DISCUSSIONS

The present study confirms that joint cartilage lesions are commonly encountered in a young adult population. This study showed that from patients undergoing knee arthroscopy for various indications, 69.6% suffered at least one type of cartilage pathology.

Similar results have previously been published by other authors in larger study populations. Curl *et al.* reported a rate of chondral damage of 63% in a study that included 31,516 subjects.<sup>7</sup> Hjelle *et al.* found a 61% incidence of cartilage or osteochondral injuries when analyzing 1,000 consecutive patients undergoing arthroscopies,<sup>8</sup> while

Aroen *et al.* found that 66% of 993 patients undergoing knee arthroscopies presented associated cartilage disorders.<sup>11</sup> In another study that included a large number of patients (5,114 knee arthroscopies), Widuchowski *et al.* found chondral lesions in 57.3% of cases,<sup>12</sup> but Figueroa *et al.* reported a lower rate of chondral tissue defects, in 41.16% of cases (82 out of 190 subjects who underwent knee arthroscopy).<sup>13</sup>

The rate of cartilage lesions fluctuated from 60 to 70% in most of the studies, their prevalence being concordant to our results.

In the present study, the most frequent site for cartilage lesions was found to be at the level of the medial femoral

**TABLE 5.** Type of chondral lesions according to the ICRS classification

ICRS Type	Incidence	%
I	64	25.9
II	139	56.3
III	27	10.9
IV	17	6.9
TOTAL	247	100

condyle (53.8%), followed by the patella (9.7%). The distribution of chondral lesions according to their anatomical location found in our study was similar to other studies on the subject.

Hjelle *et al.* reported that 58% of cartilage defects were located at the level of the medial femoral condyle, 11% in the patella, 11% in the lateral region of the tibial plateau, 9% in the lateral femoral condyle, and 5% in the medial part of the tibia.<sup>14</sup> Widuchowski *et al.* found that the patellar area (36%) and the medial femoral condyle (34%) were the most common locations of chondral tissue injuries, while the medial region of the tibial surface (6%) presented the lowest frequency.<sup>12</sup> Correspondingly, Aroen *et al.* found that 43% of cartilage injuries were located in the medial femoral condyle, and 23% in the patellar region.<sup>11</sup> Similarly, Curl *et al.* found the most common locations of damage in the articular cartilage at the level of the medial femoral condyle (32%) and patella (21%).<sup>7</sup>

In our study, the distribution of cartilage injuries within different parts of the knee joint was also in accordance with the studies referred above, but we found a higher percentage of non-isolated cartilage lesions (60.68%).

We found full-thickness lesions (ICRS grade III–IV) in only a small percentage (17.2%) of the analyzed knees. In contrast, Bikash *et al.* found that grade III, according to the Outerbridge classification, was the most common grade of chondral lesions (46% of cases), followed by grade IV (22% of cases).<sup>3</sup> Our results were also in disagreement to the results of Hjelle *et al.* (14% grade I, 26% grade II, 55% grade III, 5% grade IV lesions) and Curl *et al.* (9.7% grade I, 28.1% grade II, 41.0% grade III, 19.2% grade IV lesions).<sup>7,14</sup>

Cartilage defects are commonly associated with other pathological conditions of the joint such as anterior cruciate ligament ruptures and meniscal injuries. In our study, associated injuries of the medial meniscus were diagnosed in the highest proportion of patients (56.68%), followed by both meniscus and anterior cruciate ligament tears (15.38%). Similarly to our results, current studies show that frequently associated lesions include the medial meniscus and anterior cruciate ligament tear.<sup>10</sup>

### Study limitations

One of the major limitations of the current study is its retrospective nature. Other study limitations include the rela-

tively small number of included subjects (355 patients) and the existence of bias in collecting the necessary data from the patients' files, which may have adversely impact the reliability of our results.

### CONCLUSIONS

Chondral injuries are frequently encountered in knee arthroscopy and are present in more than half of the arthroscopies performed. An important part of cartilage injuries is accompanying other intra-articular lesions, including the anterior cruciate ligament tear and medial meniscus tear. Based on these results, it is recommended to have the necessary resources at disposal for at least one cartilage repair technique during a knee arthroscopy, due to an increased likelihood of encountering previously undiagnosed chondral damage.

### CONFLICT OF INTEREST

Nothing to declare.

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