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Review Article

Practice guidelines for approaching articular cartilage defects of the knee

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ABSTRACT

Cartilage lesions pose both diagnostic and treatment challenges to the treating orthopaedic surgeons. An early diagnosis of these lesions is the key to success, and hence awareness about these lesions is mandatory to reach a prompt conclusion and decision making. There are newer techniques published almost every day all over the world. We have tried to compile all the techniques commonly performed and the available guidelines, critically analyzed them and came up with an algorithm which suits the patients in the Indian subcontinent.

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1. Introduction

The spectrum of knowledge in knee surgery is constantly growing all around the world, due to advances in medical science and technology. However, articular cartilage defects, which are seen in as high as 40% patients with knee complaints are still not dealt with in a systematic way. Especially in the Indian subcontinent an ideal cartilage lesion management is lacking due to limited knowledge, lack of resources and proper guidelines. This article will highlight the salient features and provide guidelines to deal with such articular cartilage lesions.

2. Background

Cartilage lesions are very common entities and are seen in about 40% of the knees at arthroscopy. However, these injuries are seldom addressed adequately due to lack of patient

awareness and resources. There is a common tendency amongst patients and doctors is to wait and watch, with the hope that the knee problem would sort itself out. However, articular cartilage lesions do not heal themselves due to lack of blood and nerve supply.^{1,2} These lesions often heal by fibrous or fibrocartilaginous tissue, which cannot sustain the sheer forces efficiently and ultimately, fails. Hence, over time without treatment, these lesions which may start as small, become bigger and much harder to treat when these patients finally present to a knee specialist.

It is of paramount importance to identify these lesions early and treat them at the right time for better functional outcomes. Various radiological imaging techniques aid in confirming the diagnosis and quantification of the lesions.³ However, the suspicion of such lesions and proper clinical examination is the first and foremost important step towards treating them.

Such injuries are witnessed more often in younger individuals with active life style in whom at the moment

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Table 1 – Clinical features of cartilage lesions.**History**

1. Localized pain
2. Locking sensation
3. Feeling of catching inside the knee
4. Palpable loose body from detached osteochondral fragment
5. Feeling of instability
6. Intermittent and recurrent effusion
7. Audible crepitus
8. Aggravation of pain in kneeling, climbing stairs and prolonged sitting

Examination

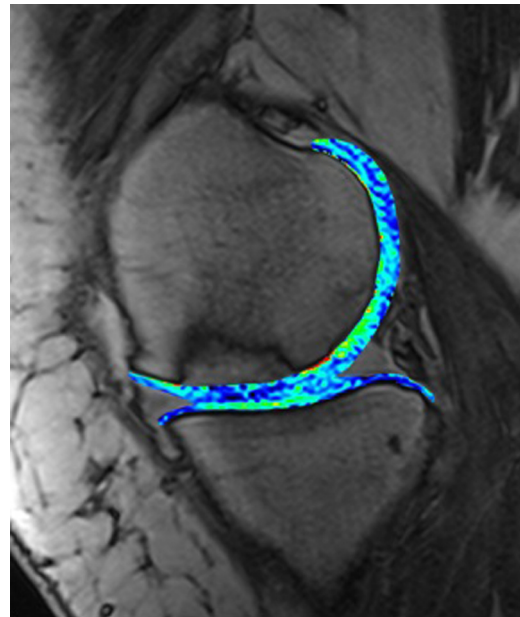
1. Fullness in the knee
2. Localized elicitable joint line tenderness
3. Palpable crepitus
4. Grinding test
5. Provocative tests like Wilson test

treatment options are limited.^{4,5} The cartilage lesions in older individuals can also be managed by cartilage restoration techniques. However, the numbers reduce because some of them are offered arthroplasty as the ultimate solution without evaluating the benefits of chondral repair procedures which are more biological and less invasive.

Evaluation of the patient (Table 1) is done with history, and physical examination to narrow down differentials and see if the symptoms are attributable to chondral pathology. The eliciting of the history may require specifically asking leading questions such as exact location of pain in the knee, duration, aggravating factors for instance climbing stairs, history of locking. Locking was earlier attributed only to meniscal pathology.⁶ However, this can be very specific for chondral defects. Imaging should include long leg X-ray of the affected limb to identify possible abnormal alignment of the joint which may be a predisposing factor towards chondral pathology.⁷ The gold standard for diagnosis of chondral injuries is magnetic resonance imaging (MRI).⁸ It helps in the localization as well as to assess the defect size and in the post-operative period contributes to evaluating the quantity and quality of the repaired tissue. In the recent times, better MRI based cartilage specific sequencing techniques are available for decision making⁹ such as Intermediate-weighted fast spin echo (FSE), 3-D fat suppressed T1-weighted gradient echo (GRE) acquisition and isotropic 3-D sequences (3-D DESS, d-D FSE SPACE) (Fig. 1). Preoperative assessment of cartilage defect is carried out based on ICRS grading system and Outerbridge's classification (Table 2).

3. Management of cartilage lesions

The management of cartilage lesions can be further subdivided into palliative, reparative and restorative techniques. The decision to use palliative technique depends on the age and physical demands of the individual. Palliative techniques help in achieving pain relief and include arthroscopic debridement, lavage and local injections. The reparative and restorative techniques differ in the type of reparative tissue formation. Reparative procedures like microfractures and drilling lead to formation of fibrocartilage which is less resistant to stress. The reparative techniques like

**Fig. 1 – MR spectroscopic image showing cartilage repair.****Table 2 – ICRS and Outerbridge's grading of articular cartilage defects.****ICRS grading**

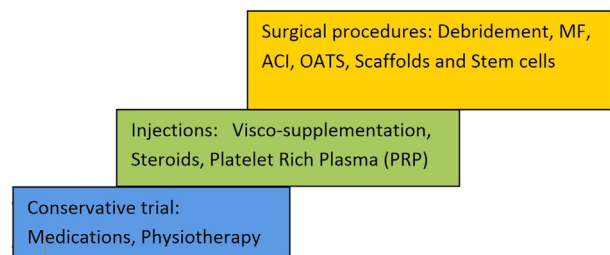
- Grade 0: Normal
- Grade 1: Nearly normal (soft indentation and/or superficial fissures and cracks)
- Grade 2: Abnormal (lesions extending down to <50% of cartilage depth)
- Grade 3: Severely abnormal (cartilage defects >50% of cartilage depth)
- Grade 4: Severely abnormal (through the subchondral bone)

Outerbridge's classification

- Grade I: Softening and swelling of cartilage
- Grade II: Fragmentation and fissuring, less than 0.5 in diameter
- Grade III: Fragmentation and fissuring, greater than 0.5 in diameter
- Grade IV: Erosion of cartilage down to exposed subchondral bone

osteo-chondral allo-/auto-grafting and autologous chondrocytes implantation (ACI) lead to formation of a more pliable cartilage in high demand individuals.⁵

A step ladder approach (Fig. 2) towards the management of cartilage lesions is described below. It is significant because the cost is also a major factor in the Indian subcontinent and

**Fig. 2 – Ladder approach to the management of articular cartilage defects.**

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