

宁夏医科大学临床学院

文献报告

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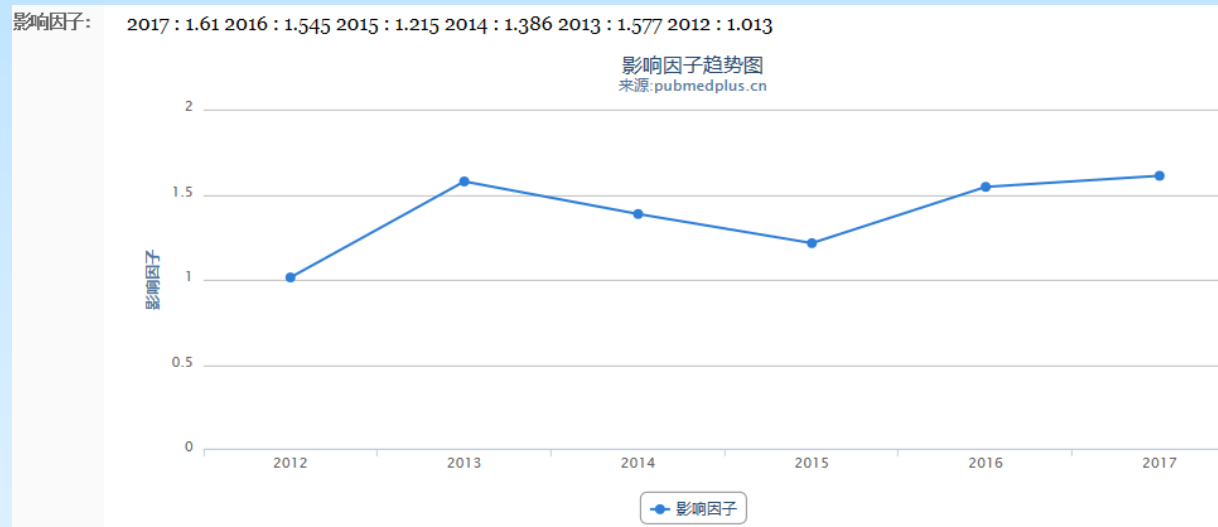
RESEARCH ARTICLE

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Upper tibial MRI vascular marks lost in early knee osteoarthritis



Michael Beverly^{1*} , Gil Stamm¹, Thomas W. Hamilton¹, David W Murray¹ and Hemant G Pandit²



IF = 1.61

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Background

It is possible that weight bearing might raise subchondral intraosseous pressure. A raised intraosseous pressure has itself been associated with pain and osteoarthritis . It is likely that if the subchondral region is subject to high forces or pressures during activity there could be anatomical or vascular modifications to cope.

Background

We observed axial subchondral radiating marks in the proximal tibia on PD_SPAIR water bright or fat suppressed axial MRI scans of the knee as in Fig. 1

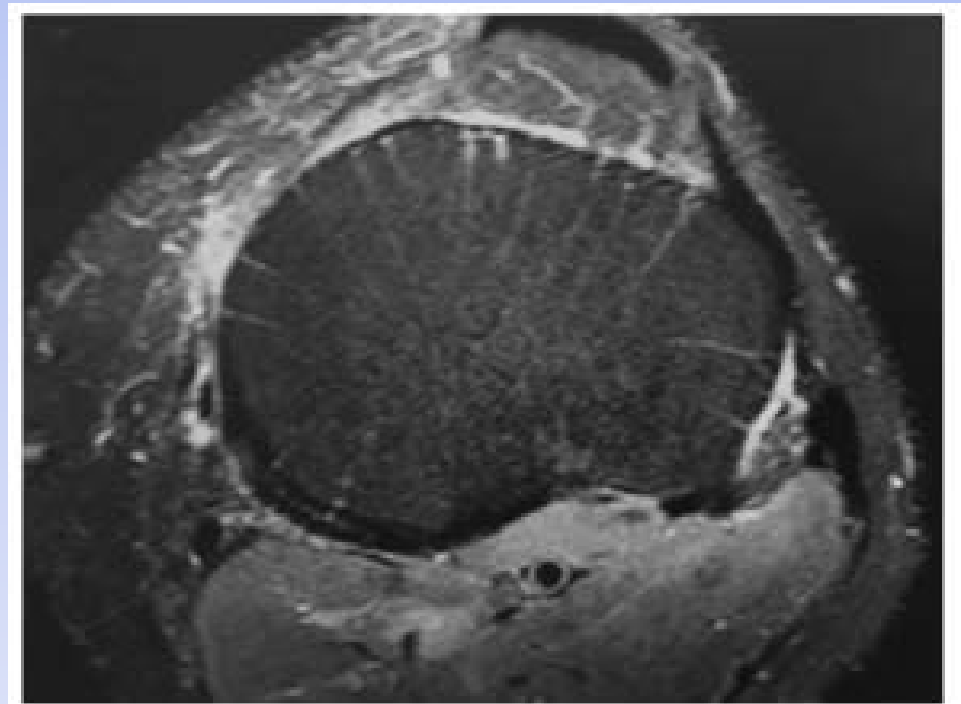


Fig. 1 Example of upper tibial axial MRI slice. A typical axial upper tibial PD_SPAIR MRI slice at level 3. White radial vascular marks are evident

Background

In this study, we were interested in the general incidence and distribution of the marks and in their association with arthritis in patients referred to our knee clinic. We studied the distribution of these marks in terms of their distance below the tibial surface and the pattern of distribution within quadrants of the axial plane.

Methods

56 patients 27 male / 29 female
 28 left / 28 right knees
age 22 years to 85 years

X-ray

within a 12 month

MRI

K-L scoring

Two researchers

MRI scoring

Results Statistical analysis

Methods

K-L scoring

Kellgren-Lawrence classification

MRI scoring method

The axial scans were divided into quadrants vertically and horizontally at their maximum diameter as in Fig. 2. The vascular marks were counted by layer and by quadrant. A vascular mark was defined as a radiating white line which reached the outside edge of the tibia.

Methods

MRI scoring method

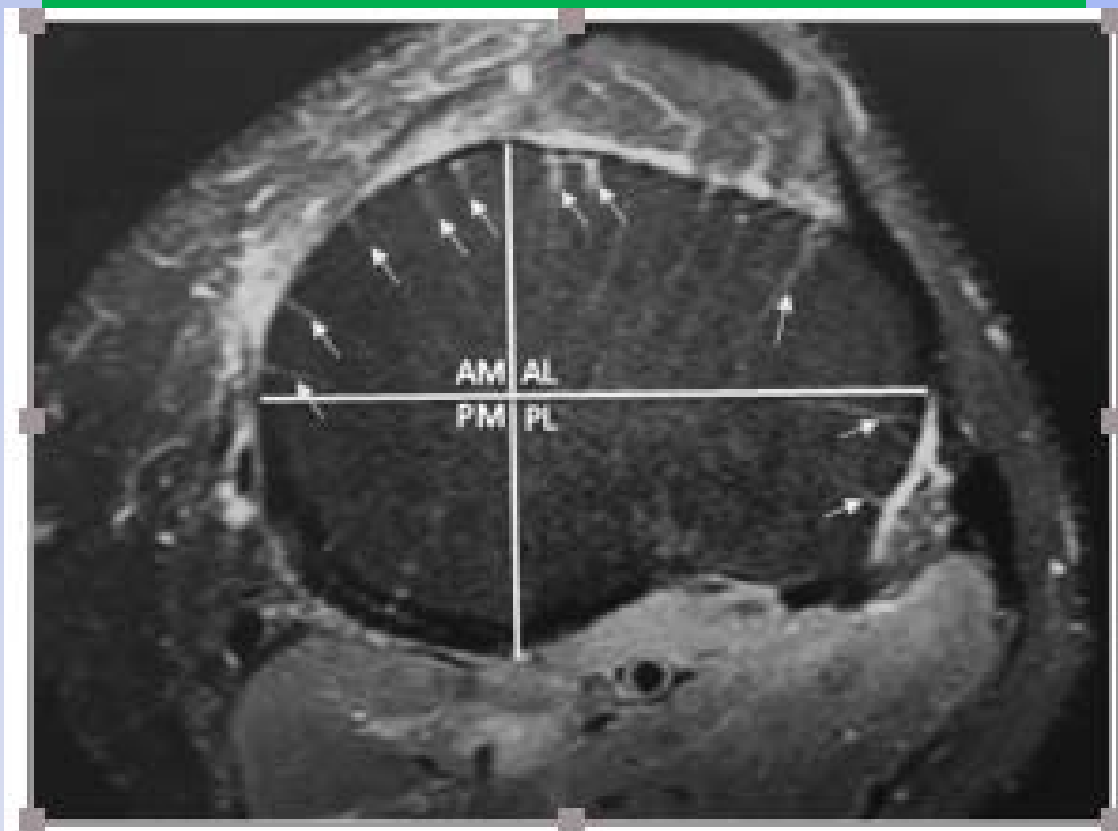


Fig. 2 Example of quadrant division and scoring. The same left knee level 3 MRI slice seen in Fig. 1 with scoring marks. This slice scored 5, 0, 2, and 3 for anteromedial, posteromedial, posterolateral, and anterolateral quadrants

Methods

1

Statistical methods

The number of vascular marks

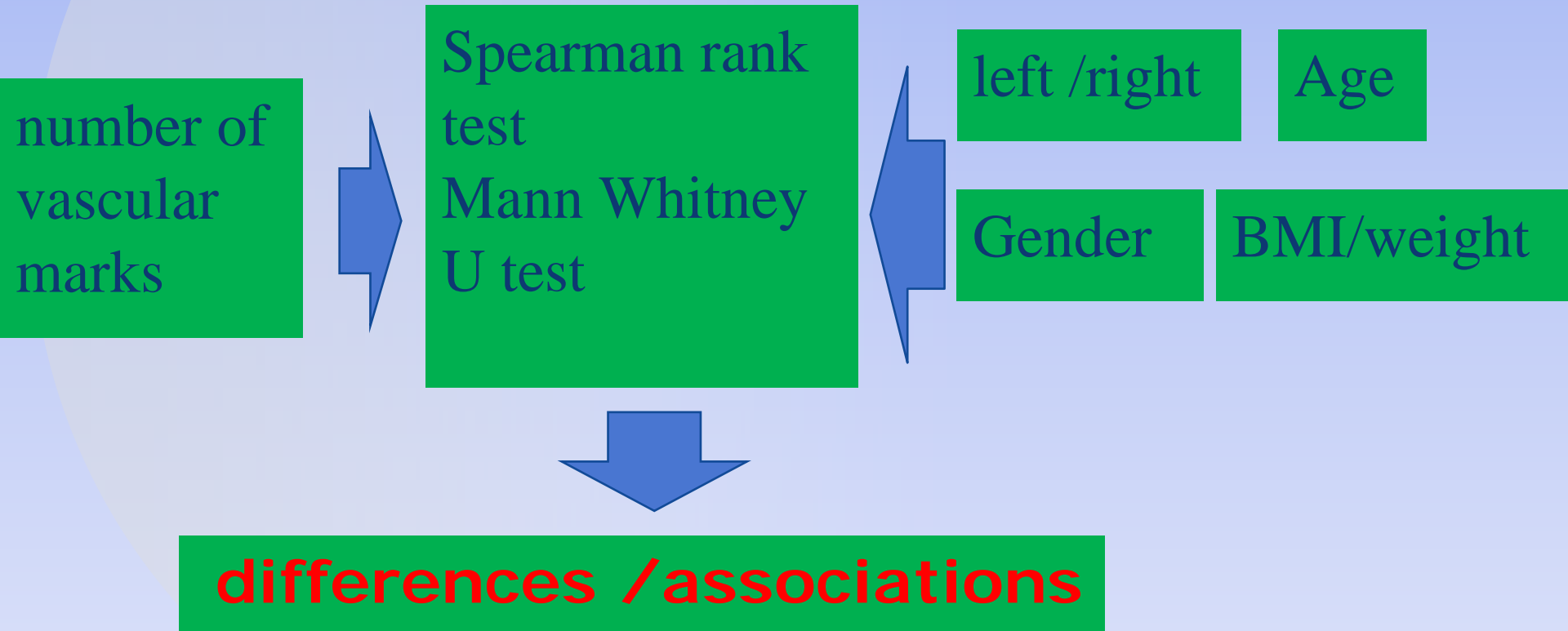
Four quadrants
(AM, PM, AL, PL)

Kruskal Wallis test
Mann Whitney U post hoc testing

differences between individual quadrants

Methods

Statistical methods



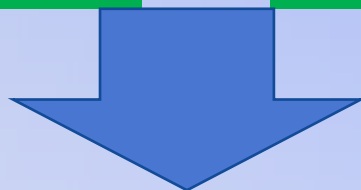
Methods

3

Statistical methods

vascular marks

grade of osteoarthritis



Mann Whitney U test



differences / associations

Methods

Statistical methods

All analyses were performed using SPSS Version 22 (IBM Corporation, Armonk, New York). Statistical significance was set at $p < 0.05$.

Results

Distribution

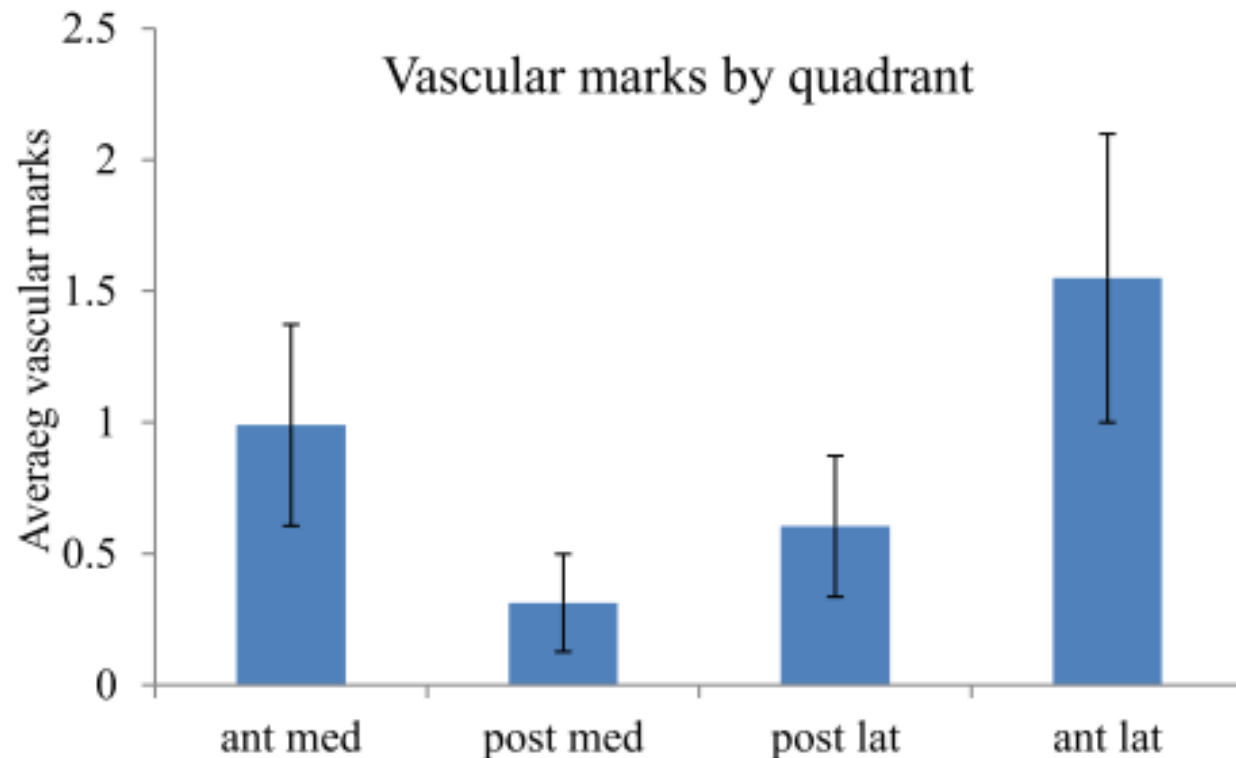


Fig. 4 Incidence of vascular marks by quadrant. The distribution of vascular marks between the quadrants showed more marks anterolaterally and fewer posteromedially, $n = 56$ knees, error bars SEM

Results

Age and left and right knees

No association between age and total number of vascular marks was detected ($p = 0.30$).

No association between the left and right knees and total number of vascular markings was detected ($p = 0.10$).

Results

BMI and weight

There was no association between the total number of vascular markings and patient's BMI ($p = 0.50$) or their body weight ($p = 0.87$).

Gender

Fewer vascular marks were seen in females compared to males ($p < 0.001$).

Results

Pattern of osteoarthritis

The plain X-ray Kellgren-Lawrence distribution of osteoarthritis grades between the knees was as in Table 1.

Table 1 Incidence of K-L grade medial and lateral sides

K-L grade in 56 knees	Numbers of patients at each K-L grade medial	Numbers of patients at each K-L grade lateral
0	16	32
1	20	18
2	15	4
3	3	2
4	2	0
Mean K-L score	1.2	0.57

Distribution of patients at each K-L grade. There was proportionately more osteoarthritis medially, $n = 56$ for both sides

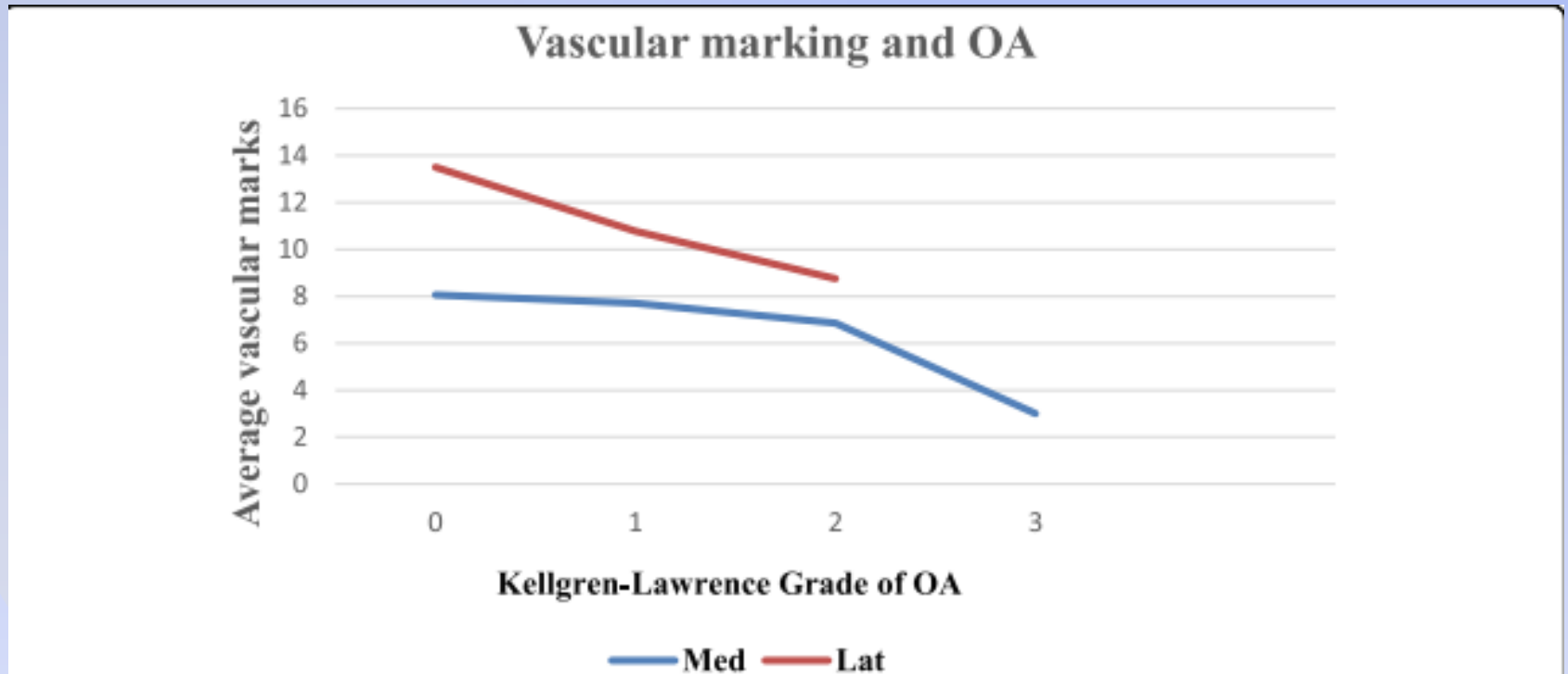
There was more osteoarthritis medially than laterally

Results

Correlation with OA

3

There were differences in vascular marks within the OA grades between medial and lateral.

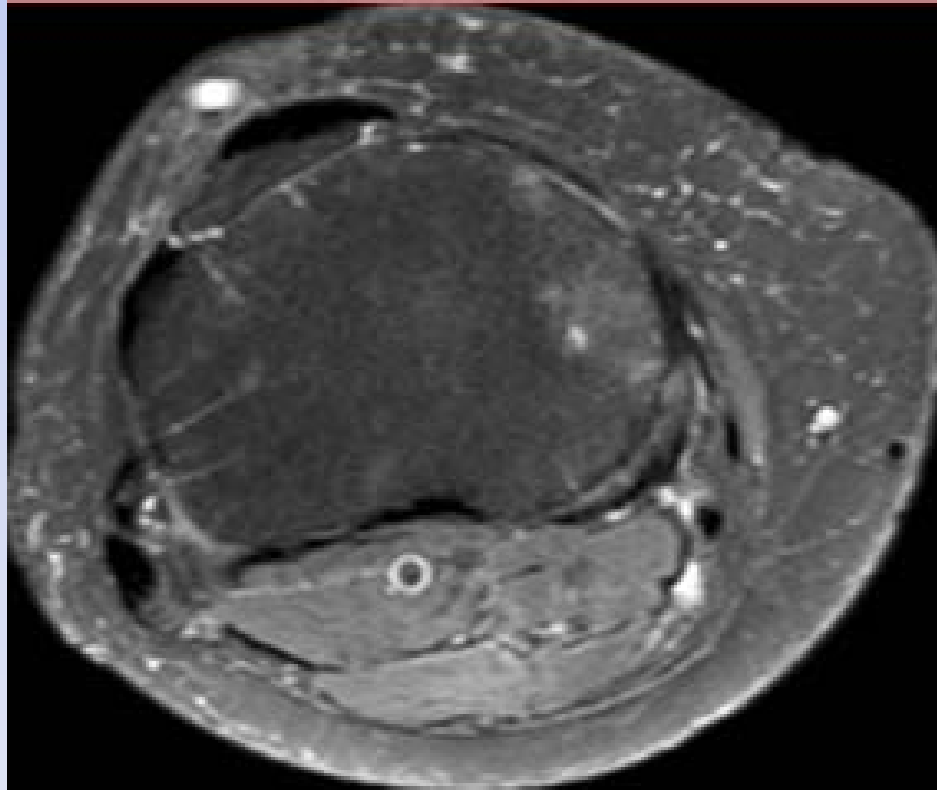


Loss of vascular marks with increasing grade of OA. The reduction in vascular mark numbers with increasing K-L grade for medial and lateral sides.

Results

Correlation with OA

As the number of vascular marks declined, the grade of osteoarthritis increased. A typical example is seen in Fig. 6.



Discussion

- ❖ We acknowledge that the K-L grading system is a relatively insensitive tool for separating early grades of OA.
- ❖ Many patients with grade 0 or 1 osteoarthritis on plain radiographs have well-established cartilage disease on arthroscopy which is not yet apparent on X-rays.
- ❖ The K-L grading system cannot easily differentiate between early grades of OA. The loss of vascular marks on MRI may be a means of detecting early OA.

Discussion

❖ There are other limitations to our study. The study is cross-sectional. Although we were able to establish an inverse correlation between the presence of vascular markings in the proximal tibia and the presence and severity of osteoarthritis, we cannot comment on cause and effect. We do not know if OA worsened, improved, or remained the same as this is a cross-sectional study rather than a longitudinal study. We are unable to say whether the increasing K-L grade is a cause of or is an effect of vascular mark changes or vice versa.

Conclusion

In conclusion, our study is the first to describe subchondral vascular marks on MRI scans and to identify an inverse relationship between those marks and the presence and distribution of knee osteoarthritis. Although cause and effect are not established, there is clearly an association. The loss of marks on MRI may be a means of diagnosing or predicting the development of osteoarthritis more accurately than by plain X-ray alone.



Thank you!