working, communicating, creating). The physical exercises, besides their contribution to keeping and improving health, also reduce the risk of dementia

3. We need clear messages thourg the media; the family (the inherited culture, financial resources), school as a source of training: the politics (how we manage the human and health resources)

4. We need messages and models, culture; the olympism includes all ideas about the olympic movement, placing sport and health to the service of a harmonious development of the human being and creating a better society.

5. We must defend our cultural and human values to the benefit of a normal society, that is why we must not neglect the development of mass sport to the detriment of professional, performance sport.

Bibliography

1. I. Drăgan şi colab, 1984, Practising Sports Medicine . Medicală Publishing House, Buc.
2. T. Bocu., S. Tache, 2004, Physical Education and Sports, part of the primary assistance for health,. Revista „Palestrica Mileniului III", Cluj Napoca.
3. D.V. Năstase, 2004, Leisure Time and Recreational Activities. Universităţii Publishing House of Pitesti.
4. I. Samoilă, 2007, Manifestations of the Communication Ability. International Scientific Conference, Galaţi.

THE ROLE OF NUCLEAR MAGNETIC RESONANCE TO DIAGNOSE THE KNEE JOINT DAMAGES TO THE ATHLETES

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Abstract

The knee is one of the major joints that bear a very high burden, ensuring in the same time mobility and stability during physical activities, and balance in maintaining the body position. Injuries at this level are quite commonly found in medical practice, often caused by practicing a sport and can result in pain and disability. Investigation through Nuclear magnetic resonance has been proved in the recent years to be the main way of non-invasive examination of sport knee injuries. It represents a paraclinic exploration/investigation widely accepted in the protocols destined to the patients with traumatic symptomatology in the knee joint, gradually replacing arthroscopy in this type of pathology. It is regarded as a top diagnostic tool in evaluating the knee joint to visualize the associated anatomical details and the associated pathology that can go from articular ligament injury to destroying the articular cartilage.

Key wards: anatomic, invasive intervention, treatment

Study of anatomic imaging

Knee-imaging requires a high quality of images, superior contrast, an ability to visualize small structures, all these challenges being met by MRI. In the last years, this diagnostic imaging method has experienced an important progress especially in the domain of musculoskeletal pathology. Arthroscopy is still considered the "gold-standard" in diagnosing the traumatic intra articular knee injuries. However, it is an invasive investigation, which requires anesthesia and hospitalization and can be accompanied by all the complications of a surgical procedure. Since its introduction in the '80s, MRI gradually gained a place increasingly important in diagnosing traumatic knee pathology, the majority of orthopedic specialists considered it a method sufficiently precise, noninvasive and fast, to right appreciate the opportunity of a conservative treatment, sparing the patient of an unnecessary invasive intervention.

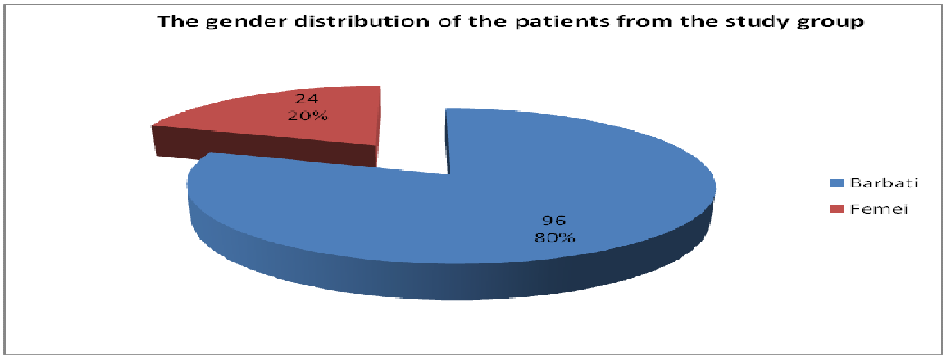
Material and the method

The study was conducted between 2010 - 2014 at CTD "Victor Babes" and included 120 patients who had an MRI exam indication of traumatic injury to the knee joint resulting from practicing a sport. In case of 40 patients, it was tracked the evolution post MRI, including here the result of arthroscopic exam and of the surgical procedure.

Results

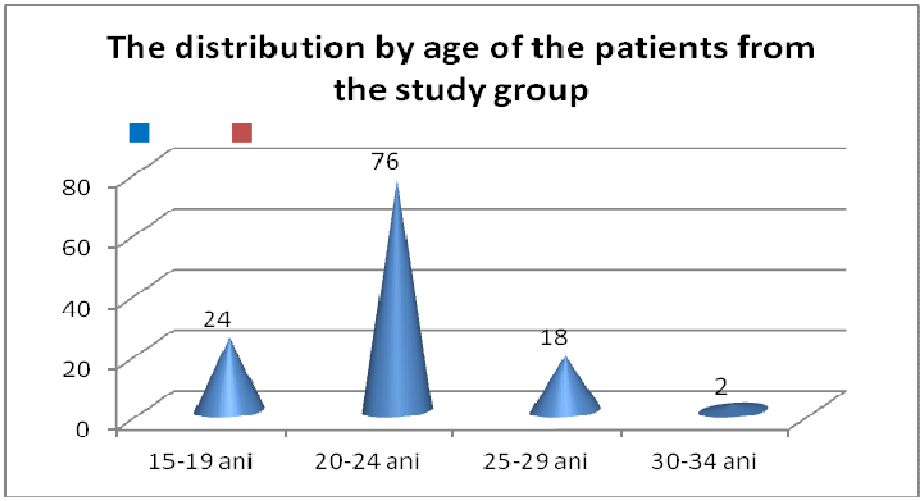
Out of the 120 patients, 96 were male and 24 female.

Chart no. 1.



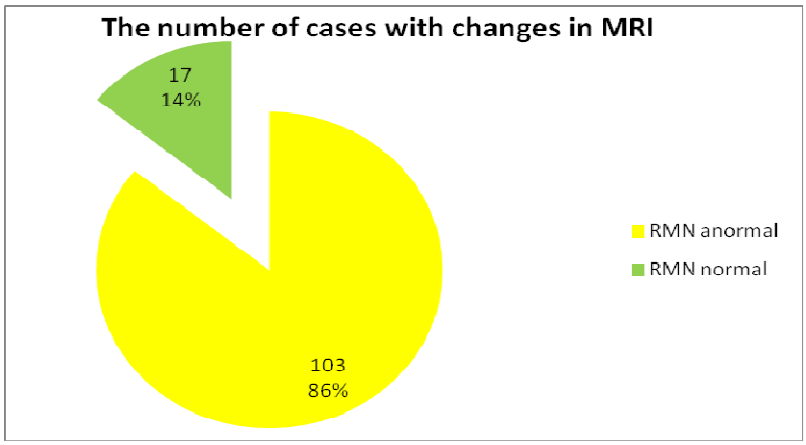
Regarding the distribution by age group, the results look like this:
- 15-19 years - 24 cases
- 20-24 years - 76 cases
- 25-29 years - 18 cases
- 30-34 years - 2 cases

Chart no. 2.



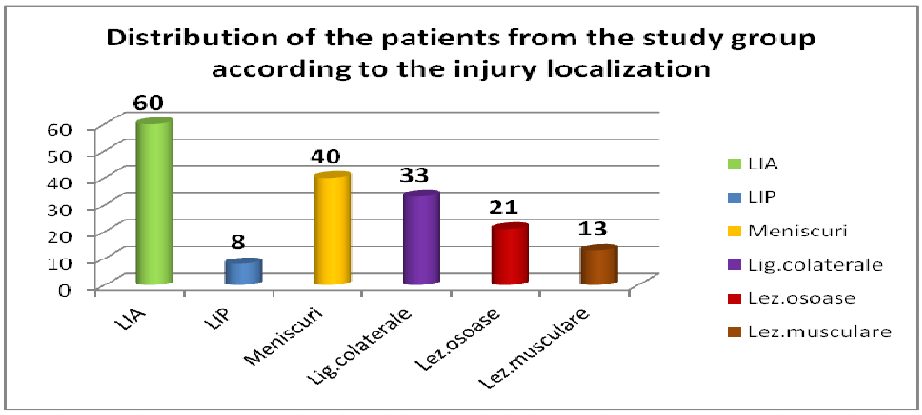
After the MRI examination, from the 120 patients who had a suggestive clinical symptomatology of an injury in the knee joint, 103 patients had obvious changes on MRI examination of the knee and 17 patients had a normal MRI examination.

Chart no. 3.



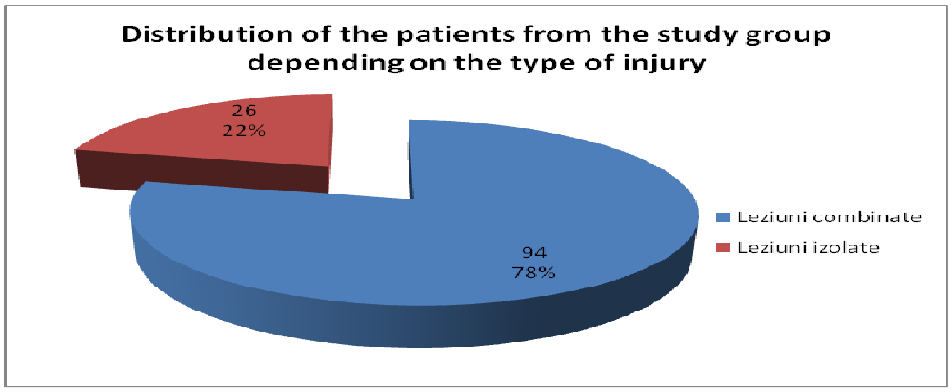
Out of the 103 patients with objective injuries diagnosed by MRI, 60 patients had anterior crossed ligament injuries, 8 patients had posterior crossed ligament injuries, 40 patients had meniscus injuries, 33 patients had injuries of the medial collateral ligament, 21 had patients bone injuries and 13 patients muscle injuries.

Chart no. 4.



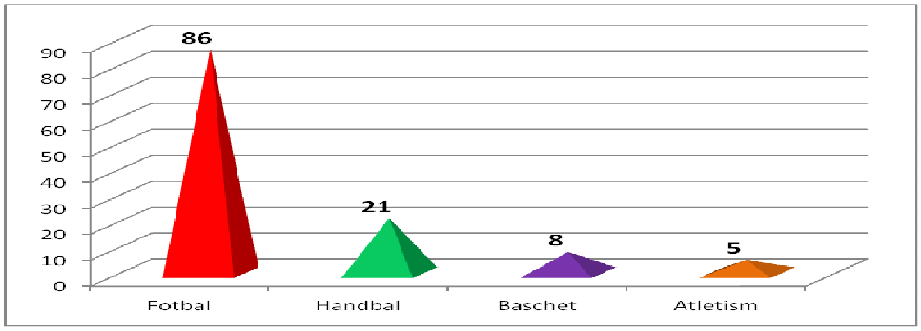
Out of the 120 patients include in the study, only 26 had isolated injuries, while the last 94 had combined injuries.

Chart no. 5



In the matter of the sport that was involved in producing injuries to the knee joint, 86 patients included in the study practiced football, 21 handball, 8 basketball and were athletics.

Chart no. 6.



Out of the 40 patients who underwent arthroscopic examination, 35 patients were diagnosed, after MRI examination, with knee joint injuries, and 5 patients had normal MRI images. Out of the 35 patients, for 32 was confirmed the MRI diagnosis after arthroscopic examination, and only 3 patients had a negative result after arthroscopy. Out of the 5 patients without visible MRI injuries, 4 had a negative result at the arthroscopic examination and only one patient had objectified injuries after arthroscopy.

In these conditions it can be evaluated for the MRI informational value and the performance of this diagnostic method in traumatic knee disorders. For that purpose we will calculate the sensitivity and the specificity of the test, and also the positive and negative predictive values.
The sensitivity of a method indicates the proportion of patients that the test is able to identify out of the entire group as a result of positive test results.
The specificity indicates the proportion of healthy individuals confirmed as being outside of the disease condition after registering negative test results.
The predictive value of positive results indicates the proportion of valid results (true) of all positive results.
The predictive value of negative results indicates the proportion of valid results (true) of all negative results.
Appreciation indicators
AP - true positive result (positive result for ill people);
FP - false positive result (positive result for healthy people);
FN - false negative result (negative result for ill people);
AN - true negative result (negative result for healthy people)
Sensitivity Se= AP / AP + FN x 100
Specificity Sp = AN / AN + FP x 100
Positive Predictive Value PPV = AP / AP + FP x 100
Negative Predictive Value VPN = AN / AN + FN x100 VG = AP + AN / AP + FP + FN + AN x100
In the case of an ideal test, Sensitivity (Se), Specificity (Sp) and Predictive Value (PV) have a value of 100% .
Applying the formulas in the case of the personal study, the table shows indicators such/as:

	Sick	Healthy	Total
Positive result	AP	FP	AP+FP
Negative result	FN	AN	FN+AN
Total	AP+FN	FP+AN	AP+FP+FN+AN
	Sick	Healthy	Total
Positive result	32	3	35
Negative result	1	4	5
Total	33	7	40

Sensitivity = (32/33) x100 = 96.9%. Specificity = (4/7) x100 = 57.14%. Positive predictive value = (32/35) x100 = 91.4%. Negative predictive value = (4/5) x100 = 80%
The sensitivity of the diagnostic method is 90% and for LIA, LIP and collateral ligament injuries is 100%. The Sensitivity and the specificity, although they are important parameters of diagnostic tests (and, incidentally, the best known) they do not help us much in clinical practice, unless approaching 100%. It can be observed from the definitions of the two indices (Sn = the probability that a patient has a positive test and Sp =the probability of a healthy to have negative test) that the approach is exactly the opposite than the practical one, when we are in front of the patient, without knowing whether it is healthy or sick, we apply the test and only after its result it should be decided this. Exactly to this problem it answers the predictive values: positive predictive value of a test is the probability that a patient whose test was positive to have the disease and the negative predictive value of a test is the probability that a patient's test was negative, to do not have the disease. Sensitivity and specificity are calculated vertically, separated from ill patients (sensitivity) and the healthy ones (specificity), so it does not matter which is the ratio of healthy and sick ones, or in other words which disease prevalence of the disease (proportion of ill patients of all patients) . On the other hand, the prevalence and positive and negative predictive values are calculated horizontally, and the predictive values depend on the prevalence of the disease. This means that if a test has been evaluated in a large addressable clinic and have achieved certain sensitivity and specificity values, these values will be valid wherever we apply this test. In contrast, for the predictive values of the test, more precisely those values that we actually use to give the diagnosis, the evolution is the reverse: low prevalence of the disease determines the decrease of the positive predictive value and the increase of the negative, and the high prevalence of the disease has the opposite effect.

Discussions

The MRI examination of the knee has become, over time, a diagnostic method of becoming more and more used and accepted by specialists in crossed ligaments injuries and meniscuses can be diagnosed with a high degree of sensitivity and specificity, but the accuracy of the examination decreases with the increasing number of injuries associated with the same patient. (1).
Although arthroscopy was considered a longtime "the gold standard" for these types of injuries, the MRI is increasingly shaping up more like a viable and trustworthy alternative, especially as it is a safe and non-invasive.
Zaire-Nizam and his collaborators conducted a study involving patients with knee injuries and concluded that MRI is a very sensitive method for diagnosing meniscal injuries (2).
Nikolaou and his collaborators studied 46 patients and reported that MRI diagnostic power was much higher than clinical examination. (3).

However, other studies reported conflicting results. Madhusudhan and collaboratos studied 109 patients with injuries to the knee and said that the physical examination was superior to MRI examination, except meniscal injuries (4).
In Mazlomy's study and his collaborators that included 92 patients, the results were similar to those of Madhusudhan, meaning that they reported a higher sensitivity of clinical examination compared with the MRI (5).
In a study conducted in Egypt on 70 patients, Behairy and his collaborators noticed that the diagnostic value of physical examination and MRI are similar, the same result being obtained in the study by Thomas and collaborators. (6,7).
The main causes for these contrasting results are probably related to the diagnostic skills of those who interpreted the results of clinical examination, arthroscopically or through MRI. In this sense, an important role plays the used MRI technique (8).
Kuikka's study and his collaborators and Ramnath and his collaborators have reported a sensitivity of the MRI investigations of 91.7%, lower than that of the staff's study, which was 96.7% (9, 10).
Mackenzie presented the first four most common reasons for false positives when it comes to a MRI exam: the variability of anatomical structures of the knee; the overestimation of other types of injuries (e.g. articular cartilage injuries) as being meniscal injuries; false negative results at the arthroscopic exam; the existence of a meniscal tear that has not spread to the articular surface.
Jee and his collaborators claimed that the MRI has a lower sensitivity in case of concomitant presence of ligament crossed previously rupture, because of the omission of lateral rupture of the meniscus, that can be a cause for the value of sensitivity in personal study (9, 10) .
In Hetta's study and his collaborators, the value of specificity for meniscal injuries is 90%
In the study of Kuikka Ramnath and his collaborators the value is 87.1%. (9, 10).
For ACL injuries, sensitivity is 86.6% Hetta's study and 91.43% for Kandha's study (13).
Rayan and his collaborators have shown similar results, respectively a sensitivity of the MRI exam in the case of ACL tears of 81%. (14).
Regarding LIP, Witonski, Vaz and his collaborators have reported a sensitivity of 100%, as in the Hetta's study (25) as in the present study (15, 16).
Some authors claimed that specific sequences of images can increase the sensitivity and specificity for meniscal and ligament injuries (17).

REFERENCES

1. Rubin DA, Kettering JM, Towers JD, et al. MR imaging of knees having isolated and combined ligament injuries. AJR Am J Roentgenol 1998;170:1207–13.
2. Zairul-Nizam ZF, Hyzan MY, Gobinder S, Razak MA. The role of preoperative magnetic resonance imaging in internal derangement of the knee. Med J Malaysia 2000;5:433–8.
3. Nikolaou VS, Chronopoulos E, Savvidou C, Plessas S, Giannoudis P, Efstathopoulos N, et al. MRI efficacy in diagnosing internal lesions of the knee: a retrospective analysis. J Trauma Manag Outcomes 2008;2:4.
4. Madhusudhan T, Kumar T, Bastawrous S, Sinha A. Clinical examination, MRI and arthroscopy in meniscus and ligamentous knee injuries – a prospective study. J Orthop Surg Res 2008;3:19.
5. Mazlomy M, Makhmalbaf H, Kashani omidi F, Mahvalati sadri A. Comparison of clinical findings with arthroscopic findings in knee intra-articular injuries. Med J Mashhad Univ Med Sci 2007;49:421–6.
6. Behairy NH, Dorgham MA, Khaled SA. Accuracy of routine magnetic resonance imaging in meniscal and ligamentous injuries of the knee: comparison with arthroscopy. Int Orthop 2009;33(4):961–7.
7. Thomas S, Pullagura M, Robinson E, Cohen A, Banaszkiewicz P. The value of magnetic resonance imaging in our current management of ACL and meniscus injuries. Knee Surg Sports Traumatol Arthrosc 2007;15:533–6.
8. Peleg B, Ely S, Hagai A, Nachman A, Arbel R. Accuracy of magnetic resonance imaging of the knee and unjustified surgery. Clin Orthop Relat Res 2006;447:100–4.
9. Kuikka PI, Sillanpaa P, Mattila VM, et al. Magnetic resonance imaging in acute traumatic and chronic meniscal tears of the knee: a diagnostic accuracy study in young adults. Am J Sports Med 2009;37:1003–80.
10. Ramnath RR, Magee T, Wasudev N, Murrah R. Accuracy of 3-T MRI using fast spin-echo technique to detect meniscal tears of the knee. AJR Am J Roentgenol 2006;187:221–5.15
11. Jee WH, McCauley TR, Kim JM, et al. Meniscal tear configurations: categorization with MR imaging. AJR Am J Roentgenol 2003;180:93–7.17
12. Khanda GE, Akhtar W, Ahsan H, Ahmad N. Assessment of menisci and ligamentous injuries of the knee on magnetic resonance imaging: correlation with arthroscopy. J Pak Med Assoc 2008;58:537–40.
13. Rayan F, Bhonsle S, Shukla DD. Clinical, MRI, and arthroscopic correlation in meniscal and anterior cruciate ligament injuries. Int Orthop 2009;33:129–32.
14. Vaz CE, Camargo OP, Santana PJ, et al. Accuracy of magnetic resonance in identifying traumatic intraarticular knee lesions. Clinics (Sau Paulo) 2005;60:445–50.
15. Witonski D. Acute traumatic hemarthrosis of the adult's knee–a diagnostic options in arthroscopic era. Literature review. Chir Narzadow Ruchu Ortop Pol 2008;73(5):339–43.
16. Helms CA. The meniscus: recent advances in MR imaging of the knee. AJR Am J Roentgenol 2002;179(5):1115–22. 22