

Abstract

Musculoskeletal symptoms are consistently one of the most commonly cited reasons for visit to ambulatory care centers every year [National Ambulatory Medical Care Survey, 2013]. Previous studies have demonstrated that many non-orthopedic physicians report a lack of confidence in performing clinical musculoskeletal examination [Matzkin, 2005]. As many as 78 - 82% of new medical school graduates fail to demonstrate basic competency in musculoskeletal examination as defined by both internal medicine and orthopedic program directors [Freedman, 2002]. These studies elucidate the need for a systematic approach to musculoskeletal examination that can be easily taught and applied by both orthopedic and non-orthopedic physicians alike.

Introduction

The "Rules of Four" is a technique developed by Dr. Nallamothe that emphasizes a systematic approach to musculoskeletal examination. With this approach the area to be examined is divided into columns each with four corresponding examination points. The points correspond to palpable landmarks that aid in the diagnosis of common musculoskeletal complaints. In this article we will focus on the application of this technique in the musculoskeletal examination of the knee.

The knee should be evaluated in a thorough but efficient manner. After some experience, the exam can be a more directed exam where the diagnosis can be obtained very quickly and accurately. After a complete history of the injury is taken, a thorough exam of the knee including inspection and palpation is performed. These two very important aspects, along with the history, may already direct the examiner towards a diagnosis.

Materials & Methods

- ◆ 25 medical students from a major medical school were given 12 minutes to complete a 10 question pre-test about knee injuries
- ◆ The students then watched a 1:51 video of Dr Nallamothe describing the Rule of Fours
- ◆ The students were then given 15 minutes to review an 8 page paper describing the Rule of Fours
- ◆ The students were given 12 minutes to complete a 9 question post-test

Results

- ◆ The average score on the pre-test was 48%
- ◆ The average score on the post-test was 68%
- ◆ There were three questions that were identical on the pre-test and post-test; the students averaged 40% on those questions on the pre-test and 59% on the post-test

Figure 1

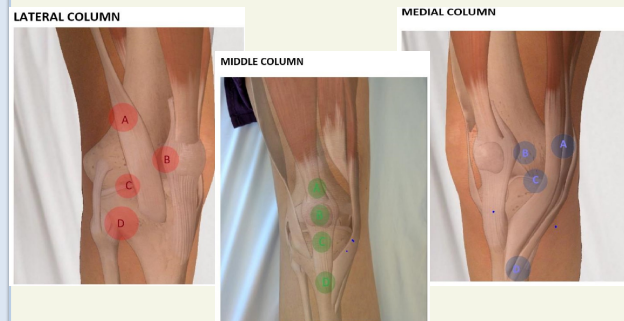


Figure 2

1A	- MCL injury	3A	- IT band syndrome at the knee
1B	- Medial retinaculum injury - Plica - Valgus ankle joint	3B	- Patellar instability
1C	- Medial meniscus tear - Degenerative joint disease	3C	- Lateral meniscus tear - Degenerative joint disease
1D	- Pes anserine tendons - Pes anserine bursitis	3D	- Proximal fibular fracture - Proximal tibiofibular joint injury
2A	- Quad tendonitis	4A	- MCL injury
2B	- Patella fracture - Patellar neuroma - Prepatellar bursitis	4B	- ACL injury
2C	- Patellar tendonitis - Hoffa's disease	4C	- PCL injury
2D	- Osgood-Schlatter's (adolescent) - Tibial tubercle fracture (adults)	4D	- LCL injury

Discussion

- ◆ We were able to show a 20% improvement in score between the pre and post test following their review of the article and video
- ◆ Additionally we were able to increase students' confidence in their ability to diagnose common from 2.8 to 3.9 (out of 5)
- ◆ The limitations of our study include the small sample size and relatively short time between reviewing the article and video and taking the post test. This could reflect that students were simply scanning the article for answers to questions they were unable to answer on the pre test.
- ◆ We were able to demonstrate, as seen in previous studies, that students do not feel comfortable in the musculoskeletal exam and that this lack of confidence can be improved by providing them a structured way in which to approach patients with musculoskeletal complaints.

Conclusion

- ◆ The "Rule of fours" provides a systematic and efficient approach to mastering the knee exam. It allows for the timely diagnosis of common musculoskeletal injuries while aiding the primary care physician in directing further treatment and diagnostic testing.
- ◆ We were able to demonstrate in our study that medical students were able to increase their understanding and confidence in interpreting a physical exam of the knee by utilizing the systematic approach outlined in this article.
- ◆ The concept of teaching the physical exam in a systematic and memorable format, as opposed to a random assortment of tests and maneuvers, could help provide graduating medical students with the foundations they need to further build their skills and confidence as they begin their post graduate training.

References and Acknowledgements

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