

Under the microscope : Assessment of microscope handling skills among pathology students.

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Abstract

Background : Proper use and handling of microscope and methodical focusing of peripheral smear, is one of the most needed skills in the laboratory. Literature search reveals that there are scarce studies published on the skills of handling microscope by medical students.

Aim : To assess the psychomotor skill of II MBBS students in focusing a given stained peripheral smear under the microscope.

Methods : Students were instructed to focus the peripheral smear under the oil immersion. Assessment was based on observation & scoring using a pre-validated checklist provided to the assessors.

Results: Average score of students was 2.43 out of 3. Boys had somewhat better handling skills than girls. The average score of boys were 2.48 and girls were 2.38.

Conclusions: Students need to be emphasized about the importance of methodical focusing of slides for better visualization of the smear which is the key for proper interpretation when combined with the cognitive (knowledge) domain.

Key words: proper handling of microscopes, microscope safety, focusing peripheral smear.

Introduction

Examination of the peripheral smear is a part of the mandatory exercise performed by II MBBS students in their routine formative and summative practical exams. Observation of the peripheral smear under the microscope is a skill and we often encounter panicky students who land up breaking the slide, adding to their agony and confusion during exams. Proper use and handling of microscope and methodical focusing of peripheral smear under oil immersion is taught to medical students in their first year physiology practicals. One of the most needed skills in the laboratory is developing effective microscope using.¹ It is not only important from students perspective, but is also required for maintenance & safety of the microscopes, which is one of the costly equipment in the laboratory. Literature search reveals that there are scarce studies published on the skills of handling microscope by medical students.

The present study was undertaken to assess the psychomotor skill of II MBBS students in focusing a given stained peripheral smear under the microscope

as peripheral smear reporting is a compulsory exercise for second MBBS students in their practical examination.

Methodology

A batch of 98 students of second year MBBS, were explained about the examination pattern. Students were not compelled to participate. 81 students who were willing were included in the study after their consent. The students chosen for the study, were given instruction about the procedure, demonstrated and had hands on experience before taking up the study. This exercise was conducted in batches over a period of four days. Twenty students were assessed on each day. One batch had 21 students. Each student was provided with a monocular microscope with inbuilt illumination system, oil and stained peripheral smear. Students were instructed to focus the peripheral smear under the oil immersion. The time allotted to perform this skill was four minutes. Each student was observed by an assessor and scored using a pre-validated checklist, which was validated by pathology postgraduates and undergraduate students other than

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Table-I: Performance of students based on observation by using checklist

| Observations | Identifies the side of the slide containing the smear | Places the slide correctly on the stage of the microscope | Focusses the slide first in low magnification | Uses oil immersion for identifying the smear | Uses fine and coarse adjustment to focus the smear |
|----------------------|-------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------|----------------------------------------------|----------------------------------------------------|
| No of students(n=81) | 77(95.06%) | 81 (100%) | 20 (24.69%) | 72 (88.88%) | 73 (90.12%) |

participants for clarity, content and relevance. The student was observed for performing the following five steps and scores allotted were as given in the parenthesis.

The student

| Check List : | Scores |
|--------------------------------------------------------------------------------------|--------|
| 1. Identifies the side of slide containing the smear. | (0.5) |
| 2. Places the slide correctly on the stage of the microscope. | (0.5) |
| 3. Focusses the slide first in low magnification. | (0.5) |
| 4. Adds a drop of oil on the smear and uses oil immersion for identifying the smear. | (0.5) |
| 5. Uses fine/ coarse adjustment to focus the slide | (1) |

Results :

Of the 81 (82.65%) students who participated in the study, 40 (49.38%) were boys and 41 (50.61%) were girls.

Table - I :

Seventy seven students (95.06%) were able to identify the smeared side of the slide correctly. All the 81 students (100%) could place the slide correctly on the microscope stage. Only 20 students (24.69%) focused the slide first in low magnification and then in higher magnification. Seventy two students (88.88%) used oil immersion for identifying the smear and 73 students (90.12%) used fine adjustment to focus the smear.

Table II: The mean scores of boys and girls:

| Scores obtained | 3 | 2.5 | 2 | 1.5 | 1 |
|-----------------|------------|------------|----------|----------|----------|
| Boys | 6 | 27 | 4 | 4 | |
| Girls | 6 | 28 | 2 | 3 | 1 |
| Total (n=81) | 12(14.81%) | 55(67.90%) | 6(7.40%) | 7(8.64%) | 1(1.23%) |

Scores of students ranged from 1 to 3. Students who secured pass scores of ≥ 2 were considered as efficient in handling microscopes. Maximum score of 3 was obtained by 12 (14.81%) students, and minimum score of 1 was obtained by one (1.23%) student. Score of 2 were obtained by 37(45.67 %) boys and 36 (44.44%) girls.

Discussion

Skill is proficiency, facility or dexterity that is developed through training or experience. Procedural skill requires practice. The fundamental skill that II MBBS students need to acquire is the effective use of microscope. Most students know to place the slide correctly on the microscope stage. However, some students err in identifying the correct side to be focused. Total mean score of all students was 2.43 and for all students to improve their skills and reach the level of 3(100%) perfection, much more practice is essential, as goes the quote "Practice makes the man perfect." Department of Physiology, Pathology and Microbiology practical laboratories provide opportunity and motivation for students to develop skills for proper use of microscope. One way of teaching skills, suggested by Rodney Peyton of the Royal College of surgeons, uses four steps:

- 1) Demonstration: Trainer demonstrates at Normal speed without commentary.
- 2) Deconstruction: Trainer demonstrates while describing steps.
- 3) Comprehension: Trainer demonstrates while learner describes steps.
- 4) Performance: Learner demonstrates while learner describes steps.

This four step approach ensures that the teacher breaks the process into manageable steps, asks the learner to vocalize the steps, and provides repetition to reinforce the learning and correct mistakes.⁷

As a general rule, it is always necessary to start and end the slide observation with low magnification as it is easiest to focus on a low power objective. Also since it is the shortest objective lens, there is less chance of scratching the lens when placing and removing the slide. Once focused in low power objective, switch over to the higher power objectives (40X, 100X etc). For 10X, coarse adjustment can be used to focus. For 40X, only fine adjustment knob must be used to focus, as the slide is close to the lens. Before observation under 100X (oil immersion) smear is observed first under low magnification, as it gives an idea about the distribution of RBCs and WBCs in the slide and the quality of the staining. Then the smear is observed under higher magnification and oil immersion.^{3,4}

One must take care to see that oil does not touch the high power objective, as it is one of the common problems encountered which spoils the high power objective. The condenser is generally lowered for low power examination and raised for high power and oil immersion observation.

Care must be taken not to cause physical trauma to the objective lens as it leaves undesirable marks on the lens and damages it. After the observation is completed, the objective is turned to low power and the slide is removed. The lens is cleaned with a lens paper only. The lights must be turned off when not using the microscope and kept covered.^{5,6,7,8} As microscopes are expensive scientific instruments, handling them properly and carefully will make them last for many years.^{9,10}

Since this study was conducted on a small group of students, the same cannot be extrapolated to all the students. Hence larger groups may be taken up for similar studies in future.

Conclusion:

No one becomes proficient at driving a car without practice and similarly, we should not expect students to be proficient at any procedural skills without

adequate practice. In the present study, only 14.8% students scored 100% and were considered to have the required skill of focusing a peripheral smear. Other students require much more practice. Students need to be emphasized about the importance of methodical focusing of slides for better visualization of the smear which is the key for proper interpretation when combined with the cognitive (knowledge) domain.

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