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Original Research Article

Effectiveness of Clinically Relevant Anatomy Review Sessions held during Surgery Rotations

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ABSTRACT

Objective: To facilitate better understanding of clinically important surgical concepts a 2-houranatomy review session in the dissection hall was conducted for the final year medical students during their surgery rotation.

Method: A quasi-experimental study was conducted on final year medical students during their surgery rotation. The study was administeredfor two consecutive academic years. For the study a 2-hour teaching session was jointly organized by the departments of surgery and anatomy in the dissection hall on selected topics. After the sessionfeedback was received via a survey questionnaire in both the years of study.In the second year of study in addition a pretest and posttest also were conducted to assess the learning of the students.

Results: A total of 191 students responded to the feedback questionnaire. Responses to the feedback questionnaire showed that 76% of the students in the first year of study and 88% of students in the second year of the study strongly agreed that revisiting anatomy labs was helpful in understanding the surgical concepts. Majority of the students agreed that the topics covered in the session were adequate. Most of the students wanted more time to be allotted for the sessions and they also wanted a lecture before the session. The paired sample t test showed themean of total pretest was 6.7±1.76 and that of posttest was 6.63 ±2.61, showing slight improvement in the scores.

Conclusion: Anatomy review sessions conducted for the final year medical students was found effective in improving learning of surgery.

KEY WORDS: Anatomy, Surgery, Teaching, Review, Cadavers.

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INTRODUCTION

Prerequisite knowledge of Anatomy for better understanding of surgical concepts during undergraduate medical education is a well-known fact [1,2].

But how much anatomical knowledge is retained by the time the students start reading surgery is questionable [3].

Most of this lack in retention of information may be due to the time gap in administration of both the courses [4]. In most medical colleges, anatomy is taught extensively in the preclinical year, whereas surgery teaching begins during the clinical years. Due to this time gap, the student may fail to recall the essential anatomy portion during their surgical exposure. Another factor that can hinder the retention of basic science concepts could be lack of understanding the clinical relevance of the anatomical structures taught during the preclinical years. The student may just focus on memorizing the structure and relations of the organs without understanding the actual clinical relevance of the topic taught.

In recent years emphasis is being given to vertical integration in medical curriculum so as to facilitate better application of basic science knowledge to understand the clinical concepts. Many teaching strategies like case-based learning, problem-based learning, are being used to initiate the teaching of clinical aspects during the preclinical years [5,6]. In addition to these measures, it is essential that the student also refreshes the knowledge of anatomy during or just before their surgical training to better understand the subject. It was well said by a surgical consultant, that anatomy has to be studied by a trainee before and not to be learnt or taught at the operating table [7]. This delivery of anatomical knowledge during the surgery training can be facilitated by the surgery faculty themselves as a prelude before their lecture. In addition,separate teaching sessions can be held with the anatomy faculty during the surgical rotation.

Practical training always scores above lectures and the role of cadavers as an aid to review the 3D aspects of human body is well known. Though many recent digital aids like virtual and augmented reality have emerged, learning with the help of a cadaver is still the gold standard. Other methods like computer assisted leaning, 3D models, and digital printing can be used asan additional aid and more so if no cadavers are available for teaching [8–12].

It is with this premise that a collaborative 2-hour cadaveric teaching session on prior selected regions was conducted for the final year students during their surgery rotation.

METHODOLOGY

A quasi-experimental study was conducted on MD6 (year 7) undergraduate medical students atduring the surgery rotation. The study was conductedfor two consecutive academic years.

Approval for the study was obtained from Institutional Ethics and Research Committee (CMHS/REC/022/18/C).

During the studya 2-hour teaching session was jointly conducted by the departments of surgery and anatomy in the anatomy dissection hall.

Surgery rotations for the undergraduate medical students in the institution are conducted in six batches where each batch undergoes a six weeks rotationwith approximately 20 students in each batch. 120 students were enrolled in the course, hence six sessions were conducted to address all the students.

Prior to the session faculty from both the departmentsmet at multiple meetingsand decided on the topics to be discussed, after whichthe session learning objectives were prepared, and face validated by the faculty.

A feedback questionnaire also was prepared in order to receive students perceptions about the effectiveness of the session, to receive suggestions for further improvement of the sessions including the anatomy teaching in the preclinical years. The questionnaire contained close ended questions and an open-ended question which was face validated.

During the session two stations were arranged, one for the structures above the diaphragm and the other station contained the structures below the diaphragm. The students were divided into two groups with 10 students at each station,after an hourof teaching at a particular station the groups interchanged.

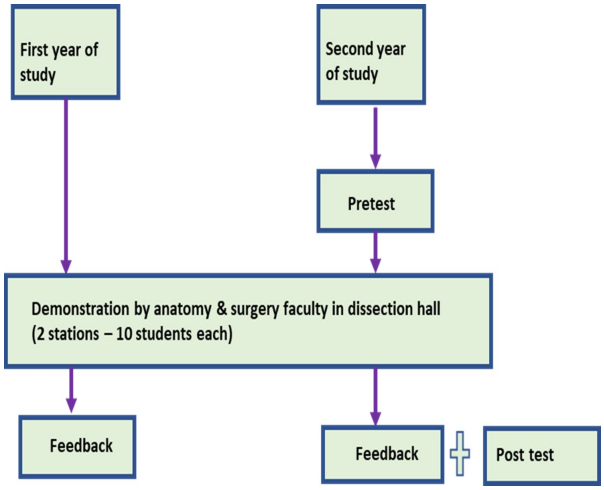
Demonstration onthe cadaver was first done by the anatomy faculty, focusing on the anatomical location and relations of relevant structures. This was followed by the surgery faculty outlining and emphasizing the clinical relevance of the structures. Certain surgical concepts and methods of surgery were also

discussed.

After the session the students filled in the feedback questionnaire administered on paper, after the informedconsent.

In the second year of study a pretest and posttestwere also conducted. The pretest was administered prior to the labdemonstration, and after the teaching session within a week based on the availability of time the post test was conducted in order to assess the retention of learning. The pretest and the posttest had 10 questions each, 5 questions were based on basics of anatomy whereas the other five were from surgical anatomy.

A diagrammatic representation of the methodology is illustrated in picture 1.



Picture 1: A diagrammatic representation of the methodology.

The responses of the feedback questionnaire and the results of the pretest and post tests were analyzed using IBMSPSS version 25. The internal consistency of the questionnaire was measured by obtaining Cronbach's alpha and was found to besatisfactory(Cronbach's alpha value was .61).

Descriptive statistics using frequency and percentages was used to analyze the responses to the close ended questions of the feedback questionnaire.

The pre and post test scores were analyzed by the paired sample t test.

RESULTS

Reponses of the student feedback: Out of the 120 students from each year of study who attended the session only 91 students responded to the feedback questionnaire form from the first year of study and 100 students from the second year.

The questions asked in the feedback questionnaire administered to the students are displayed in Table 1.

Question No.1 and 2 were asked to know, whether during and after the surgery lectures the students could recall anatomy. Studentswere given ranges of the percentages and they had to choose (in percentage) how much of anatomy knowledge they could recollect. Response to question 1 showedthat very few students self-reported remembering more than 50% of anatomy. Striking similarity was seen between the opinion of students in year 1 and in year 2 of the study (graph 1).

The second question was asked to know how much anatomy students recalled after studying the topic in surgery theory classes/ rotation. The responses showed that once the students studied the topic as part of the surgery teaching, they recalled the related anatomy of the topic better.(about 80%). Only very few students (6 & 13% students) in both the years reported that they could recall 100% of the anatomy (graph 1).

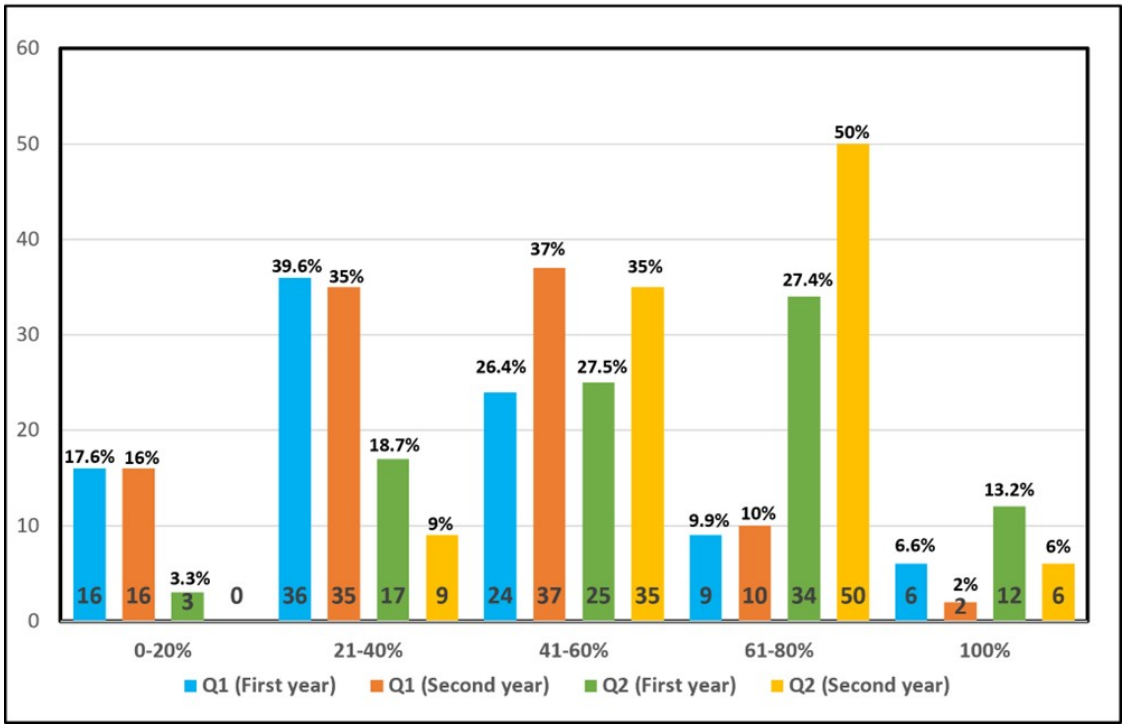
Question no 3, was asked to know effectiveness of the session. 76% of the students in the first year of study and 88% of students in the second year of the study strongly agreed or agreed that revisiting anatomy labs was helpful in understanding surgical concepts. Hence it was observed that majority of the students found the sessions effective (graph 2).

When asked if the topics covered in the session were adequate (question 4), 55% students from year 1 and 73 % of students from year 2 agreed or strongly agreed (graph 2).

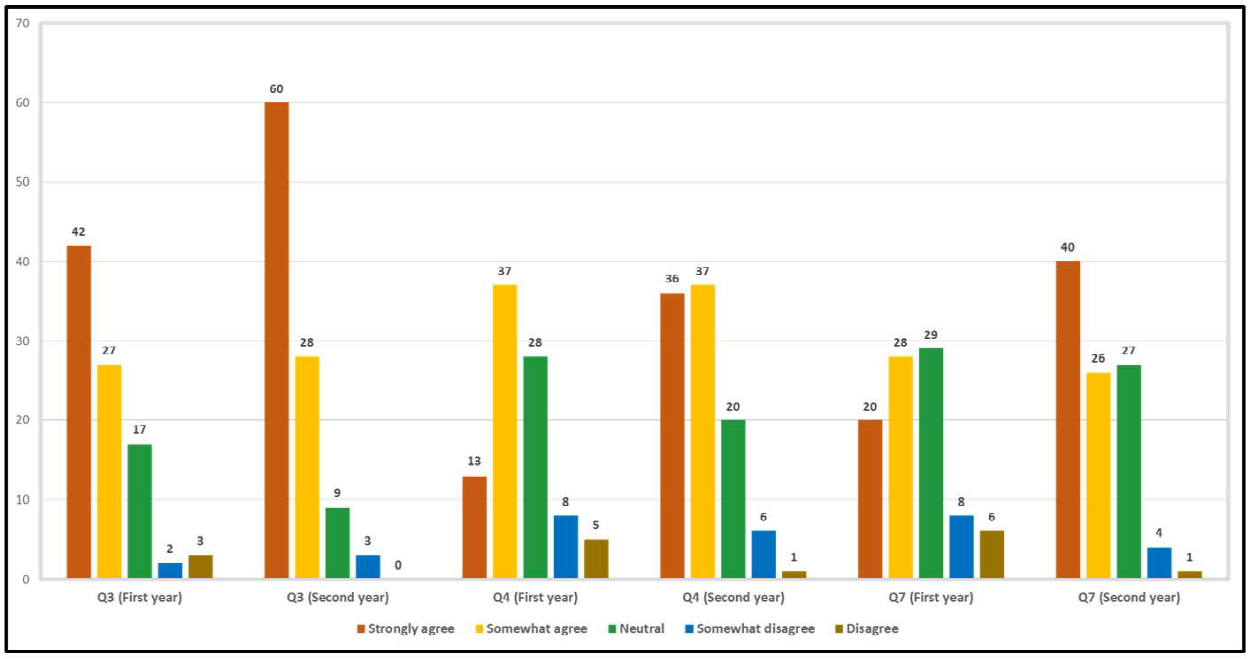
For both the question no 3&4, response of students from year two of the study who agreed or strongly agreed was more as compared to the student in yearone, inferring that the students in the year 2 comparatively found the session more effective. This may be because of the changes done in the session based on the feedback received after the year one of the study.

Table 1: Questions asked in the feedback.

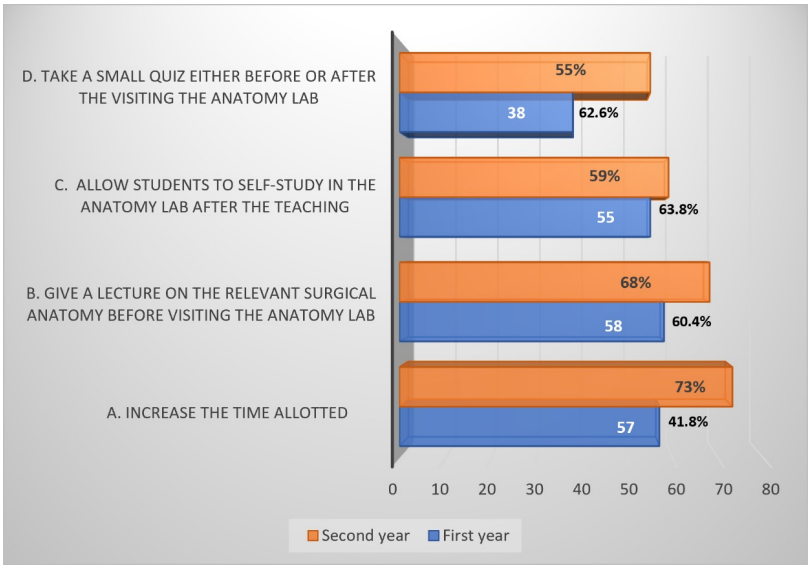
Question no	Question
Q1	How much Anatomy do you think you could remember at the beginning of final year?
Q2	How much Anatomy were you able to recollect after the lecture of that topic was taken in surgery?
Q3	Do you think that the teaching sessions in the anatomy lab (during the surgery posting) helped you to understand the surgical aspects of the topics better?
Q4	Were the topics covered during the anatomy revisit were adequate?
Q5	What other topics do you think should have been covered?
Q6	What are your suggestions, to make the revisit to anatomy lab more beneficial?
Q7	Whether the anatomy content covered in the pre-clinical year (year 4) was adequate to prepare for the clinical years
Q8	What parts of anatomy during teaching in the pre-clinical year (year 4) would you like to be emphasized more



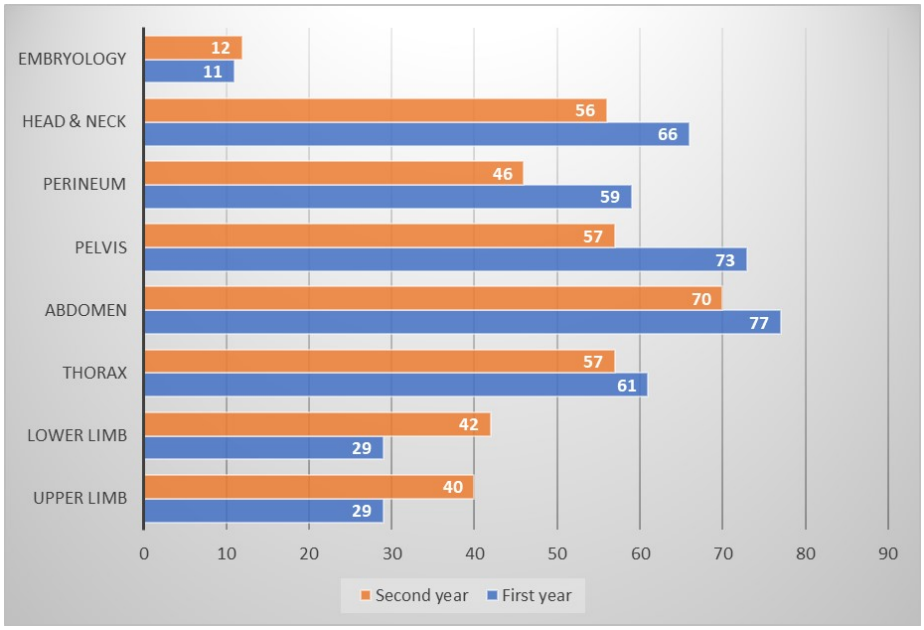
Graph 1: Response of students to question number 1 & 2 in the first and second year of study.



Graph 2: Response of students to question number 3,4 & 7 in the first and second year of study



Graph 3: Response of students to question number 6 in the first and second year of study.



Graph 4: Response of students to question number 8in the first and second year of study.

Students were asked to list out other topics (question 5) that they felt could be covered in the session. A varied number of topics were suggested (upper limb, lower limb, nerves and vessels, intestine etc) and were of wider categories that can be difficult to cover given the shortage of time.

Suggestions were asked on what could be done more to improve the session (question 6). A list of close ended options wasgiven, and students were allowed to choose more than one option (graph 3).

From year one of study suggestions to allot more time for the review session, for self-study and a surgery lecture before the session had almost equal percentage of responses.

Whereas in the study year two majority of responses was to allot more time for the session (78%) and then to take a lecture before the session(69%).

Along with the close ended options, space was provided for students to express any suggestions they had.

Few of the responses are,

"*I personally think a visit to the anatomy lab should be done weekly during surgery. It is difficult to recollect entire anatomy in a span of few hours.*"

"Have more shorter sessions before or after our lecture."

"Review session before final MD exam."

Question no 7 were asked to assess the adequacy of anatomy teaching in the preclinical year and receive the opinion of the students about it helping their study in the clinical years. The authors believed that there opinion will be valuable feedback as they have progressed in their medical studies and have gained a bit of experience of the medical field.

The response of the students on the adequacy of the anatomy teaching on preparedness for clinical years majority of the students in both the years of study strongly agreed or agreed (graph 4).

The authors wanted to know what topics the students in clinical year felt was important to be taught during their study in the preclinical year(question 8). During the preclinical years in the institution, anatomy is taught regionally, starting from upper limb, thorax, lower limb, abdomen, pelvis, perineum and head and neck. Students were given option to choose more than one system they felt was to be emphasized more during the preclinical year. Majority of the students in the year of study choose abdomen followed by perineum, whereas embryology was the topic that was least selected (graph 5).

Results of the pretest and post test conducted (table 2):

Table2: Comparison of pre and post test scores of the students in the second year of study.

Total marks	Mean	Standard Deviation	Difference in mean	t value	P value
Pre-test	6.17	1.76	0.458	1.377	*0.172*
Post- test	6.63	2.61			
Basic anatomy marks					
Pre-test	2.98	1.05	0.635	3.612	0.423
Post- test	3.61	1.15			
Surgery related anatomy marks					
Pre-test	3.19	1.28	-0.177	-0.804	<.001
Post- test	3.01	1.73			

A total of 96 students attempted the pretest and posttest in the second year of study.

The mean of the total pretest was 6.7±1.76 and that of posttest was 6.63 ±2.61. the mean difference of the scores was 0.458 showing a slight improvement in the scores but they were not found to be significant.

When analysis of basic anatomy related scores was done then the mean scores of those questions in the pretest was 2.98±1.05 and in the posttest was 3.61 ±1.15. The mean difference was 0.635 which was slightly more than the mean difference of the scores of the total questions.

The mean difference of the scores of the surgery related anatomy questions was -0.177, indicating no improvement in the scores.

DISCUSSION

In the present study a positive response was obtained on the introduction of anatomy review session during the surgery postings of the final year students.

Majority of the students in the present study expressed that they could only recall up to 40% of the anatomyprior to their surgery rotation and after the topic was covered during surgery posting they could remember up to 80%. This indicates that a brief review of anatomy is essential to help students recall basic anatomy that was previously taught in detail.

The importance of anatomical review during study of surgery has been highlighted in many studies. Programsboth for undergraduates and surgical residents to review clinically relevant anatomy have been implemented in many institutions in different ways [13–18].

Based on the report that only 17% of recently qualified doctors in their institution had anatomical knowledge to pass exam that was focused on clinical application, Dawson et al

corroborated the views of Phase III undergraduate medical students on the need for introducing teaching packages of basic sciences to support clinical learning in the later years of the undergraduate teaching. Majority of the students who were in the start or the end of the phase III combinedly agreed that it was essential to introduce anatomy teaching during the clinical years [19].

Ivarson et al, in their study used near peer student teachers to facilitate anatomy teaching to the fourth-year undergraduate medical students during the surgery clerkship. The near peer students arranged a 4-hour workshop where the students had a chance to study the learning objectives required by the surgical curriculum on a pre dissected cadaver. The students were appreciative that they could get a chance to review the required anatomy during their surgery course and was administered in an effective way by their knowledgeable and friendly near peers [20].

A surgical boot camp was organized by Zhang et al that included lectures, dissection and simulated operative procedures on cadavers for final year medical students in order to prepare them well for the internship program. Not only this method was well received by the students,but a significant improvement was also seen in the clinical skills of the students who participated in the program [21].

A session similar to the present study was conducted by Baidwan et al, for the final-year students duringtheir surgery clinical posting. Pre and post tests were conducted to assess the learning outcomes, perceptions of students and faculty was assessed with a feedback questionnaire and focus group discussion. Their study reported that there was a significant improvement in the post test scores, and most of the students agreed that the session helped them in clearing the concepts in surgical anatomy [22].

In the present study there was a minimal improvement in the mean of post -test scores of students, this can be attributed to it being formative and hence required motivation on the part of the students to utilize the opportunity provided to them,it may also be due to the amount of time allotted was not sufficient to review the topicswhich was expressed in their feedback.

There is always a question on the mind of the faculty are we teaching enough anatomy? and if the anatomy taught in the preclinical year is relevant.The review session is an excellent platform to get the views of the final year students on the way the course is delivered during the preclinical year. Taking use of the opportunitywhen asked in the feedback questionnaire, if anatomy content covered in the pre-clinical year was adequate to prepare for the clinical years, majority of the students responded positively.

The return of final year students to the lab to review anatomy not only helps the students but also boosts the confidence of the faculty in anatomy as they are reaffirmed of the importance of the subject they are teaching and the role it has played in the growth of a medical student.

Kramer et al conducted a study to understand the topics in anatomy that was perceived difficult by the students after completion of the course. Most of the students expressed the pelvis, neuroanatomy and the perineum as difficult topics in gross anatomy [23],

in a similartype of study conducted by Hall et al neuroanatomy, head and neck and pelvis were considered difficult [11].

Students perceptions of the importance of topics may vary over the years. What was perceived important by a student after their first encounter with anatomy as a preclinical student can be different to the time, they come to learn the same in the clinical years.

In the preclinical years for most of the students it is subject they need to study in order to pass the exam but once they come to clinical years anatomy is more in context as it is required to understand the surgical concepts hence even the difficult topics may now be viewed as important and more clinically relevant. This was well reflected in a study conducted by Gorgich et al where students were asked to express about the purpose to study anatomy.The findings in the study showed that the students in the preclinical years studied anatomy for clearing the exams

whereas students in the clinical years studied mostly for improvingtheir clinical knowledge [24].

In the present study the students were asked to give their opinion on topics they felt should be emphasized more in the preclinical years so that it would benefit their study of clinical subjects. Majority of the students expressed that abdomen and pelvis followed by thorax were topics that needed to be taught more during the preclinical years. This may be because most of the topics covered in clinical years deal with these regions and may be perceived difficult by the students.

The results of the study highlighted the importance of review of anatomy utilizing practical demonstrations in addition to review of anatomy during surgical lectures for the final year students during their clinical years. The authors also felt that the review sessions not only are important for the students academically but also helps themreconnect with their teachers in the preclinical years, an emotional facet that can strengthen the student teacher bond.

CONCLUSION

The overall goal of a medical educator is to produce a medical graduate who has sufficient knowledge to address the community they serve. Various steps need to be taken so that the student understands the clinical impact of the topics being taught in the preclinical years as well to see that the student has sufficient chance to revisit the basic science topics to enhance their learning. Revisiting the anatomy lab during the surgery postings is one of the ways in which this objective can be achieved and has proved to be an effective method of vertical integration. The session not only enriches the student academically but also strengthens their bond with their teachers.

Author Contributions:

Smitha Elizabeth - Manuscript writing and statistical analysis
Nitin Vishwakarma- Manuscript writing & critical analysis,
Sathyanaryana Rao - Data collection
John Muthusami - Conceptualization of the idea & data collection

Conflicts of Interests: None

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