

MILA in Teaching Oral & Maxillofacial Surgery

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Abstract:

In most of the dental colleges in India lecturing in large groups is the usual mode of teaching. Students find it difficult to understand, particularly in certain topics of oral surgery. MILA technique involves dividing students into smaller groups and coupled with activity training. Teaching students in smaller groups is more effective and also increases the attention to each and every individual. This increases interaction between students and teachers, less time for teachers to manage the larger group of students, helps students to think better and transfer of knowledge in smaller groups is more effective. MILA provides an equal opportunity for all students to take part in the discussion which is also coupled with activity which will make lecture classes more of an interactive session rather than being uneventful. This article gives a outlook of MILA technique in teaching topics like impaction, local anesthesia, medical emergencies, lymphatic drainage of head and neck, salivary gland disorders, midface fractures, mandibular

fractures, zygomatic fractures, maxillofacial cysts, pre-prosthetic surgeries, orthognathic surgery, space infections etc.

Keywords: MILA, activity training, small group lectures, oral surgery.

Introduction:

Dental college curriculum is aimed at undergraduate students in practical and theoretical areas. Main objectives of our curriculum should be based on developing students' technical and clinical skills(Burdurlu et al. 2020). Lecture class for a large group of students is a very common practice in India and it is also one of the oldest forms of teaching. Teaching students in smaller groups is more effective and also increases the attention to each and every individual. This increases interaction between students and teachers, less time for teachers to manage the larger group of students, helps students to think better and transfer of knowledge in smaller groups is more effective. Oral surgery deals with more clinical aspects and application oriented, which needs individual training. This type of small group training MILA proves to be more effective in training undergraduate students in our institution with better clinical knowledge when compared to traditional methods.Our team has extensive knowledge and research experience that has translate into high quality publications(Govindaraju, Neelakantan, and Gutmann 2017; Neelakantan et al. 2012; Panda et al. 2016; Sathivel et al. 2008; Ramadurai et al. 2019; Danda, Tatiparthi, et al. 2010; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Sajan et al. 2011; Danda, Muthusekhar, et al. 2010; Gopalakannan, Senthilvelan, and Ranganathan 2012; Kumar et al. 2006; Mehta et al. 2019; Neelakantan et al. 2011; Praveen et al. 2001; Samuel, Acharya, and Rao 2020) In this article we have discussed MILA training in various oral surgery topics which is as follows.

MILA in teaching Impaction

Management of an impacted tooth and transalveolar extraction are usually one of the fundamental topics in oral surgery. Though it appears to be a simple topic, any failure in proper assessment, clinical judgement and skills can make it extremely complicated. Undergraduate students have difficulty in understanding the classification, assessing the difficulty index and choice of surgical procedure. This has been widely reported in various publications(Pippi 2014)(Susarla and Dodson 2005)

We utilised Learner-Centred, Problem based learning method of pedagogy for a class of final year undergraduate students. The protocol included preliminary flipped class teaching and textbook reading. This was followed by each student to trace an intraoral periapical radiograph of an impacted lower third molar and the adjoining anatomical structures, including the second molar, mandible and inferior alveolar canal. Then each of them were asked to draw the WAR lines on the traced radiograph(fig-1). This was supervised and checked individually by the instructor (an oral surgery faculty ; staff : student ratio 1:15) . Following this, keeping an open textbook to cross check the Winters and Pell and Gregory's classification, each student charted the classification and Pederson's difficulty index. Along with this the tracing of inferior alveolar nerve was done and the relationship of the nerve to the tooth was evaluated.

Having completed the above exercise, the discussion was now focussed on treatment planning. The decisions the student had to make were 1. the feasibility of doing the procedure as a simple elevation (soft tissue impaction with no bone or tooth lock) or surgical removal, 2. In case of surgical removal –the choice of LA vs GA was to be made, 3. The choice of incision, 4. The need for tooth split or not, 5. The pattern of bone cutting, 6. The technique of tooth splitting, 7. Socket debridement and wound closure. Although the indications and classification can be consistent, diagnosis and treatment planning may have variations(Pippi 2014)(Ali et al. 2014). Hence, the answers to the above questions were written out and again discussed with the tutor and explanations were given with reasoning. When the theoretical concepts are well understood, hands-on pedagogy is implemented. Hands-on operations have been associated with the stages of developmental theory. When students are exposed to activities that engage the minds with concrete things and perform with hands, the knowledge provided becomes trustworthy and re emphasised with long lasting memory (Kyerere 2017). Students are trained to feel and cut bone and tooth on cadaveric mandibles to simulate real patients.

The experience of bone cutting, tooth splitting and tooth elevation gives the student an inner confidence and enhances their interest in the subject. There has been a dramatic increase in student understanding, case diagnosis and treatment planning. This is evident in their everyday clinical case judgements, answer papers and interest to explore their postgraduate colleagues acts in minor OT.

Overall, we believe teaching students by this method is effective for teaching Impactions or transalveolar extractions and most surgical procedures.

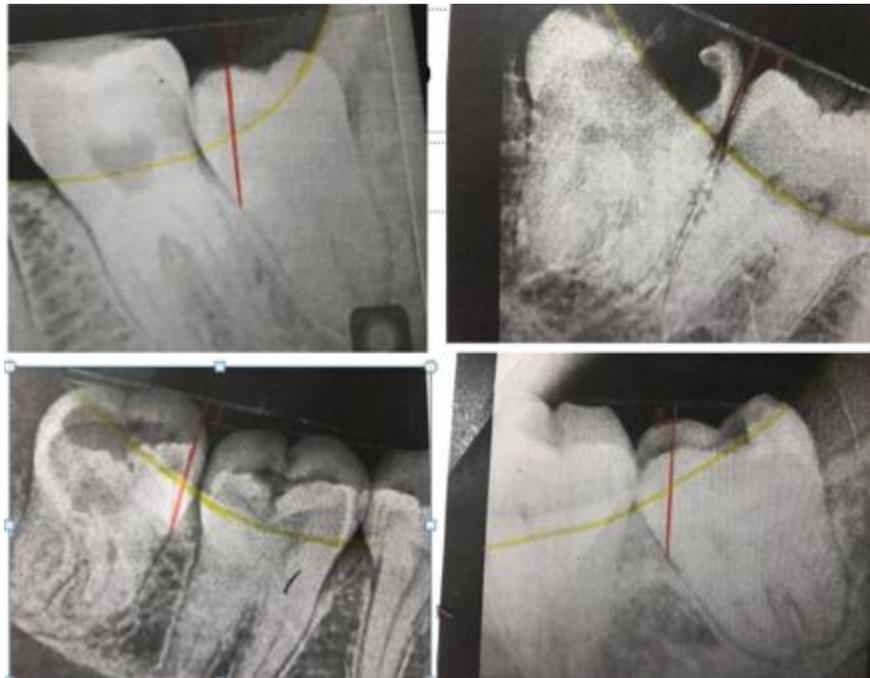


Figure-1-Tracing WAR lines.

MILA in teaching Local Anesthesia

The topic of Local Anaesthesia (LA) is very important as it is the first step in every oral surgical procedure. An undergraduate student should know about the anatomy of nerves, the mechanism of action of the LA solution and the various injection techniques. When they start their clinical postings, they find it very hard to identify and relate the landmarks and sites clinically. Students have difficulty in understanding the mechanism of action of LA , anatomy of the nerves, various injection techniques. This has been widely reported in various publications(Lee et al. 2015). (Cite 1,2, 3 etc..)

We utilised a student centered learning method of pedagogy in a class between 2017 to 2018. The protocol included flipped class teaching and textbook reading followed by interactive activities such as roleplays, demonstrations of various injection techniques using skull models and by tracing the anatomical pathways of the nerves on skulls. They were also given an activity where they were asked to load an LA solution in a syringe and inject it into fruits and vegetables to get a feel of giving the injections in patients. This in turn made them more confident when handling patients requiring procedures under local anaesthesia.

There has been a dramatic increase in the response and the understanding of the students about LA. Earlier, before we switched over to this form of pedagogy, during the clinical postings of the undergraduate students, they would not be aware of the techniques and the anatomy that much. We had to teach them the same thing again to get them to understand. But once we started this method, we saw an increase in the level of understanding among the students. They were confident in their clinical postings to identify the landmarks and give the injections with very little help from us. Their ability to answer questions based on LA was also much improved compared to the previous teaching methodology.

Overall, we believe teaching students by this method is effective for learning local anaesthesia. We believe that there is a greater understanding of the subject at the theoretical as well as the clinical level for the student.

MILA in teaching Lymphatic Drainage

Lymphatic drainage of the head and neck is one of the complex topics. Anatomy in general is difficult to teach and also difficult for the students to understand unless they have practical experience. Unless the students master head and neck anatomy, diagnosis and treatment of patients with maxillofacial diseases becomes arbitrary. One such topic that helps the students to master head and neck anatomy is lymphatics.

Head and neck lymphatics is first taught to students with a power point presentation detailing the anatomical structures in general and their drainage pattern. Next text book reading of the same is encouraged. Flipped classes model is followed throughout as the flipped classroom encompasses some approaches like active and collaborative learning, problem-based learning and project-based learning(Prince 2004).The advantages of flipped classroom model has been documented.

Some advantages of the flipped classroom(Zappe et al., n.d.)(Dollar, Ulseth, and Steif, n.d.)

For students	For teachers
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Learn at their own pace	Work closely with students in the classroom
Engage concepts with peers	Improve student attitudes
Frustration levels remain low	Teachers can group students together
Particular benefit to those students whose personality types and preferred learning styles impair their performance in traditional educational environment	Improve students' ability to solve open-ended problems

These are covered in a single class and then once the students are taught the basics, next different clinical scenarios are discussed wherein each student is given a case scenario and asked to present it and discuss the lymph drainage pattern.

Case based learning in medical teaching has been used for years. Today medical teaching is being charged with presenting discipline-specific concepts with an emphasis on clinical relevance while advancing active learning, critical thinking, communication skills, and other professional competencies. Problem-based learning has been widely introduced to support these educational goals(Bowe, Voss, and Thomas Aretz 2009). It has been concluded from the above article that CMT represents a feasible and resource-conservative pedagogical format to promote critical thinking and to integrate basic science principles during the preclinical curriculum.

Also the students are divided into partners and encouraged to examine of all the head and neck lymph nodes on their partner. Team Based Learning allows medical educators to provide students with resource effective, authentic experience of working in teams to solve real life clinical problems (Parmelee and Hudes 2012). Prior to this exercise the students are first taught the hand movements to examine the lymph nodes on a model student. This type of individual teaching encourages the students to examine a patient confidently and present the case diagnosis to a faculty with much ease.

Active learning is an umbrella term that embraces a variety of teaching and learning techniques. These include case-based learning, experiential learning, peer problem solving, and project-based learning(McCoy et al. 2018). All or

combination of these are used in the classrooms of our college to enhance the student's perception of the subject and increase his confidence to treat a patient with ease.

MILA in teaching Maxillofacial Cysts

MILA in teaching Maxillofacial Cysts and its treatment is a very complicated concept. Students have difficulty in understanding the treatment procedures and indications of each procedure in different cystic conditions concepts. This has been widely reported in various publications (Fidele, Yifang, and Liu 2019)

We utilised balloons to demonstrate marsupialization and enucleation...method of pedagogy in a class between 9:30 to 12:00 . The protocol included was for Enucleation 2 balloons were taken and inflated first balloon was filled with alginate mix tied and allowed to set the second balloon was slightly inflated and the alginate filled balloon was put inside the second balloon and tied, now a enucleation kit was taken and students were allowed to give incision on the first balloon (as the mucosal layer) then the second balloon (cystic lining) was reflected with a soft tissue curette and the whole of second balloon (as the cyst with lining) whole was completely enucleated.

Marsupialization for this procedure 2 balloons were taken and first balloon was filled with water and tied the second balloon was inflated slightly and the first balloon was put inside the second balloon and tied now marsupialization kit was taken and students were asked to give incision on the first balloon (mucosal incision) after which second balloon was encountered (cyst with cystic contents) then an elliptical incision was placed on the second balloon and the cyst decompressed then the first balloon and the second balloon margins were sutured together and keeping the cystic cavity patent.

There has been a dramatic improvement in answering their theory paper because they are able to understand the procedure properly and there was no confusion between the two procedure which was the common mistake everyone did earlier (increase/ decrease/ no change) there is a definite improvement in their viva related to these two procedures they were able to explain step wise the overall procedure impressively.

Overall, we believe teaching students by this method is effective (whatever the result is) for teaching treatments of cysts i.e: enucleation and marsupialization.

MILA in teaching Pre-prosthetic Surgeries

Teaching Pre-prosthetic surgeries for Undergraduates is challenging. Understanding the techniques of Pre-prosthetic surgical procedures involves understanding of 3 Dimensional anatomy of the structures involved, which cannot be explained effectively by theoretical presentations.

To be able to orient the anatomical landmarks as the theory is explained simultaneously makes the class more effective

A learner centred problem based learning method of pedagogy was undergone. The protocol involved preliminary flipped class reading and text book learning. The objectives of Pre-prosthetic surgery are to eliminate the pre-existing disease, to conserve oral structures, to provide residual ridge for withstanding masticatory forces and restore aesthetics and function.

Skull models were used to explain and were distributed among groups of 4. Replication of buccal mucosa was done using wax sheets and it was easier to demonstrate concepts and procedure of vestibuloplasty, by performing mock/model surgery. Thereby POGIL was implemented.

For demonstrating concepts of Direct and Indirect Sinus lift, analogy of trenching in Warground was explained, and the students were given the situation as to how they will react and active discussion happened., thereby concepts of direct sinus lift and indirect sinus lift were explained.

Alveoloplasty procedures were simply explained through cast models and also the need of ridge augmentation and various techniques involved were demonstrated in simulation models(Hill et al. 2003). Pictures of edentulous ridges, and case photos where pre-prosthetic surgical procedures were indicated were projected among students who were divided into teams of 4. Students were given time and discussed. The discussion mainly focussed on diagnosis of the existing condition, the prosthodontic options available and the procedures that can be performed to achieve the maxillary and mandibular ridges to achieve desired results. Based on which the procedures were explained step by step till a clarity is attained among the students. The discussions were very interactive and two-sided in contrast to the conventional large group classroom learning.

This has led to a dramatic increase in student understanding ability. Procedures that are difficult to explain such as Transpositional flap vestibuloplasty also known as the lip switch, which is technically difficult to discuss even with tools like videos of preformed surgeries. The orientation would be still difficult unless the student gets his/her hands on in a model. This is very important for every student to thoroughly understand as he/she will have to explain the procedure to the patient before performing.

Basically the procedures were broadly classified into two. Hard tissue procedures and Soft tissue procedures. And depending on the complexity, they were classified into simple and advanced. Advanced procedures such as visor osteotomies and ridge extensions were explained, videos were projected and the students were made to do them in models.

Thereby this Interactive Learning Algorithm effectively helped in thorough understanding of the concept which were previously considered difficult by conventional means.

MILA in teaching Maxillofacial Space Infection

Maxillofacial space infections are one of the most interesting and most complicated sections in the field of oral and maxillofacial surgery. It is interesting because the drastic improvement noted in patients immediately after providing the right solution. To know the right solution the source of infection has to be found in the first instance(Iwanaga et al. 2020).

This portion of understanding the source of comes from understanding the intricate anatomy and paths of spread of pathology. These concepts no matter what illustrated with diagram on a white board and marker pen will not be sufficient, because this will need a 3-dimensional pictorial or model based visualisation of the above mentioned concepts.

For this reason two techniques were used.

1. Clay model preparation:

- Students were asked to depict models of each space using coloured clays marking all the layers and contents of the space. This made it easier for them to visualise the real time structures in a more convincing way.
- Following preparation they were asked to explain this to their friends, who raised doubts in the same and this made it more interesting as well find out the missed areas of conceptual understanding.

2. Balloon inflation with alginate models :

- The treatment of space infection involves a decompression of the abscess cavity. Descriptive explanation of this will not give the student a feel and motor coordination of the procedure. As with surgery any procedure needs a lot of refined motor skill and good hand eye coordination.
- Hand eye coordination is a result of continuous practice of a selected set of procedures. Coordination is at its best when the procedure is practised on a near look alike models.
- So we created a balloon model .
 - Balloons were inflated with three different solutions
 1. Water
 2. Red coloured solution
 3. Alginate
 - Water :
 - It was used to depict swelling due to cellulitis.
 - During decompression cavity oozes clear fluid rather than pus
 - Red coloured solution:
 - Few swelling have blood filled cavities. To depict blood red coloured solution was used.
 - Alginate
 - This was kept to depict pus exudation.
- Students were asked to arrange the armamentarium needed for the procedure. Again reinforcing the theoretical explanations
- Once the armamentarium was ready they were asked about the sterilisation aspect of it and reassuring the previously read theoretical concepts.
- Students were asked about the methods of holding the instruments and demonstrated with the same.
- Following this they were asked to perform incision and drainage on the balloon models.
- Doing this made students have a clear feel of procedure performed and the theoretical steps have now been converted into muscle memory, which needs no effort to memorise the concepts which have to be read many times.

By employing these, out of the box novel ideas we found the overall interest shown by students in theory class turned manifold and their deeper understanding of the complex concepts was at its best. The enthusiasm shown by students in learning newer topics even at the last 20 mins of the theory class was close to 95%. Otherwise the

enthusiasm generally fades at the end of class, because the ability of the brain to concentrate such long hours is close to impossibility.

Feedbacks were collected from all the participants of MILA based lectures. Feedbacks pointed out that students were feeling confident about the subject as they have visualised it and it was easy to remember as compared to memorising.

All these positive feedback were reconfirmed with results of the assessment exam which showed an outstanding improvement in scores across the batch and not just the selected few in class.

MILA in teaching Salivary Gland Disorders

Salivary gland disorders are a complicated concept to understand. These disorders are common and a thorough understanding is necessary for proper diagnosis and treatment. Salivary gland disorders include developmental disorders, obstructive and traumatic lesions, inflammatory conditions, functional disorders, autoimmune conditions, and neoplastic lesions. Students encounter difficulty in understanding the surgical anatomy, physiology and pathology of salivary glands as reported in publications (Leung and Kember 2006).

We utilised student-centered method of pedagogy in the class, as students participate in the evaluation of their learning (Kember 2009). The protocol included initial flipped class teaching followed by book learning. Students were divided into groups and were involved in small group discussions. Each group was given separate activities. Team based learning was encouraged as it will create healthy competition and motivate the students of one group to outperform the others, thus increasing the overall productivity in learning. Students were asked to classify salivary gland disorders and explain about specific conditions in detail. If there are any mistakes, students of other groups will point them out and rectify them.

A powerpoint presentation on the topic was given to reinforce the points that they learnt during their previous activities. Also, videos were presented to showcase the various surgical procedures in detail. Later Quiz was conducted to assess their level of understanding. Faculty also discussed with the student on one to one basis and clarified their doubts.

Later various case scenarios were given and the students were asked to identify the condition and provide a suitable treatment plan with a note on complications of the surgical modalities. Thus, case-based learning was promoted and the students were engaged in active rather than passive learning. It helped in their critical thinking, professional communication skills, thereby improving their overall competency in solving real-life clinical problems (Lammers and Murphy 2002).

Having completed the above exercises, the students were presented with patients having salivary gland disorders during their clinical postings and were asked to diagnose them. They would take a proper case history in a systematic way, provide provisional diagnosis and propose a treatment plan. Thus, the habit of active case-based learning was inculcated among the students (Kember, Leung, and Kwan 2002).

There has been a dramatic increase in students' ability to understand the pathology of salivary glands, its diagnosis and management. This was evident in their answer papers, everyday clinical case judgements, and were able to

recommend proper treatment options for their patients. Thus Overall, we believe training students by this active learning method is effective for teaching salivary gland disorders.

MILA in teaching Mandibular fracture

Mandibular fracture is an important topic to be covered for undergraduate students. Just by taking lectures and reading books will not give complete understanding on maxillofacial trauma (Stacey et al. 2006). Surgical anatomy, diagnosis and management of mandibular fracture is difficult to understand by undergraduates as they are usually not exposed to post graduate department and operation theatre.

We utilised the new method of teaching called MILA (A NEW EDUCATION SYSTEM BY PROF.DR.DEEPAK NALLASWAMY), which creates the active learning environment for the students. Instead of hours of lecture and entire students in a class, MILA replaced with 20 minutes of lecture followed by activity based learning for a small group of students. This method of teaching gives a individual student care and motivates student to perform well in class.

Incorporating MILA in teaching mandibular fractures makes the student understand the subject in depth, even if they are not exposed to post graduate department and operation theatre. For a duration of 120 minutes lecture class, MILA is framed in such a way that both lecture and activity is interspersed to make students interactive and attentive (Table-2). This improves their concentration and lateral thinking. Hours of lecture alone make the student bored, sleepy and they won't understand the subject three dimensional. So this MILA is scheduled as three 20 minutes lecture and three activity based learning followed by assessment

Table-2 :

Class	Time	Topic
Lecture	20 minutes	Surgical anatomy & classification
Activity	20 minutes	Game based learning E.g. Clay model and threads

Lecture	20 minutes	Clinical and Radiographic diagnosis
Activity	20 minutes	POGIL(process oriented guided inquiry learning)
Lecture	20 minutes	Management 1. Conservative 2. Surgical
Activity	20 minutes	1. wiring technique in stone model 2. plating system demonstration 3. Hand on in skull model

Flipped class:

Pre-recorded keynote video about mandibular fracture. Students will go through this video before the class and it helps the student to understand the concept much easier and can ask their doubts in class and clarify

Assessment by concept mapping:

Students can be assessed by doing concept mapping about the mandibular fracture. This method of learning encourages students to show keen interest in the subject. After completion of this session, every student is able to do a clinical and Radiographic diagnosis for a trauma patient who comes to their respective clinics and they will be able to do treatment planning and explain the patient as well. Overall MILA is an effective method of teaching

MILA in teaching Midface Fracture

There are so many methods of teaching that have evolved for centuries, dating back from the Gurukulam system to recent technology mediated “e “education methods like Byju Apps. Even though so many teaching methods are there, we the department of Oral and Maxillofacial Surgeons felt that task was a little tough to make our students completely understand the inner core of our subjects. After reading students test papers, class notes and their answers for viva voice ,I personally felt that even the meritorious students themselves cannot fully understood the maxillofacial surgery, then I realized that our subject needs to taught in a different manner because ours is the only subject in the undergraduate curriculum in which students are unexposed to practical aspects. Our Saveetha under graduates are highly fortunate in this world because they are one and only students who are able to do Fixed Partial Dentures, Implants, flap surgeries, Root canal Treatments particularly molar RCT, and Fixed ortho appliances. In this way they are unique when compared with other college students who are unable to perform all these at U.G level. But when considering our OMFS department, the problem is common everywhere because of the curriculum which concentrates extraction as the one and only U.G level practical module, but for theory they must study all topics starting from Impaction to latest distraction Osteogenesis that too without even seeing one surgery. Undergraduate student in our college is doing all practical works like FPD ,Implants, RCT s ,Fixed Orthodontic Appliance on their own, which makes them to easily understand the theoretical aspects of the subjects, but for surgery they are doing only extraction as practical, so I found that just by imagining the subject will not help them to understand ,so I felt that the Pedagogy in teaching lies in giving some practical demos in models, and live case discussions, demo surgical videos.

So, I kept MILA as Making students Intellectual in their Learning Aspects. Keeping this in mind, the midface trauma chapter was taught to students.

In this student were initially taught with conventional power point methods and they were asked whether they understood. Then students were grouped into two groups. The skull model was shown to them, the basic anatomic structures in the mid face like maxilla, piriform rim, pterygoid plates, zygoma, infra orbital rim, fronto zygomatic suture were shown. Then students were asked to study about Lefort fractures in a book and then asked to draw Le fort lines in the dried skull models and if unable to do then Le fort fracture I,I,III lines were demonstrated(Milne et al. 2020). Later with the dried skull model itself the clinical features like displacement, deranged occlusion, orbital rim fracture causing entrapment were demonstrated. With this the students were able to understand the concepts in midface fractures easily.

Apart from this to easily understand the clinical features, the students were grouped into 3groups and clinical picture photos were shown to them initially and they were also demonstrated about clinical features like occlusal derangement ,numbness of infra orbital region, depression of malar region, step defect during palpation, decreased mouth opening in zygomatic arch fracture, circum orbital ecchymosis, sub conjunctival hemorrhage, decreased vertical movements of the affected eye ball due to entrapment were demonstrated. This helped me to make students easily understand about the clinical features of mid face, zygomatic complex fractures, orbit fractures.

Then comes the task like radiographic findings. For that also the grouped students were shown and individually explained about radiographic findings of mid face, ZMC and orbital fractures like starting from showing them the basic fracture line how it will look in OPG and CT, then how to identify the fractures in CT, check with normal side, and hemisinus, muscle entrapment like honey dew appearance in coronal sections of CT in case of orbital trapdoor fracture and in Zygomatic arch fracture, the depressed arch how it affects the mouth opening, Dolan's lines, Roger's lines were explained.

In books also there are pictures for clinical features and radiographic findings but students could better orient themselves when they were shown different images of different patients, live patients, and images of CT, OPG, PNS XRAY with pictures and films.

What's next? The difficult task in management of fractures the books they will simply keep some pictures with most theory which was difficult for the students to orient themselves into the surgical aspects. So the students were shown with photos how the fractures will look if you operate, how to approach, identify the fracture. They were explained about the concepts of Open Reduction/ closed Reduction, and how to reduce fractures for example Gille's approach for zygomatic fracture, and reduction of infra orbital and ZMC fractures.

Later in dried skull models plating technique were also demonstrated to the three groups. And if some students want, they are asked to make a drill in the skull so that they can be able to get the feel of operating, for Post Graduates, apart from all these they asked individually to drill and do volunteer fractures and fix it with plates and screws. In the operation theatre the Post graduates were asked questions regarding the mid face fracture topic and they were also asked to present the case before surgery. The students will study and come with the notes they prepared, then with the live patient the P.G will be asked to do starting from incision, identification of fractures, reduction and fixation of fractures by themselves and guided them accordingly.

Implication for future:

Post graduates have chance to experience the live surgery and they can easily understand after seeing the surgeries personally, but for undergraduates after all these demonstrations they can understand the subjects well, rather I am of view that if even undergraduates were allotted with few weeks of OT posting to observe and assist major surgeries, they can easily orient themselves with the theoretical aspects like other branches as they do the practical works on their own. Patient images were used for demonstration of clinical features in mid-face fractures (Fig-2).



Figure-2

Video of demonstration of vertical gaze in mid face fracture:

The video demonstrating the restricted vertical eyeball movements of the affected side are enclosed separately as we could not upload here.

Similarly, CT image were used for demonstration of mid-face fractures(Fig-3).

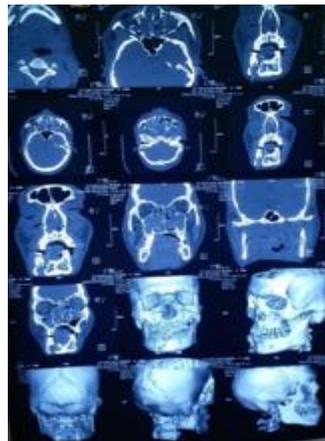


Figure-3

For better correlation, we used Surgical treatment photos for demonstration(Fig-4)





Figure-4

MILA in teaching Surgical Reduction of Zygomatic Arch fracture

Dentists are bio-engineer! said anonymously. Thus an academician in dentistry is a glorified tooth bio-engineer.“ Oral maxillofacial surgery is a unique speciality of dentistry as it is a bridge in between medicine and dentistry. Hence teaching maxillofacial curriculum for undergraduate as well as postgraduate will be challenging since and the maxillofacial surgeon has to knowledge bridge in imparting medical and dental speciality curriculum to undergraduate and postgraduate students.

Teaching maxillofacial surgery curriculum for undergraduate has certain shortcoming as an undergraduate as not exposed to all surgical procedures done in post-graduate syllabi. Moreover, the subject (OMFS) itself requires correlation with clinical as well as applied anatomy to understand. Henceforth an undergraduate student might feel unrealistic and boredom if maxillofacial surgery is taught as routine PowerPoint presentation classes, chalk and board or OHP sheet etc..

I felt “ MILA” teaching methodology will make syllabi of “ Oral maxillofacial surgery more interesting and approachable, even applicable in their clinical practice. Hence I started practising MILA teaching methodology for undergraduate in my routine teaching schedule

Below here I am narrating one of my topics being taught to undergraduate students with simulation -kind of surgery activity for better understanding of surgical technique and to get the live feel of instruments used in that particular procedure.

Maxillofacial trauma is one of the cumbersome topics in Oral and maxillofacial surgery.

Moreover teaching an undergraduate and making it understandable on Surgical management technique of Zygomatico -Maxillary Complex (zmc) fracture is not easy. Undergraduates have difficulty in understanding various aspects in zmc -topic starting from its complex anatomy to numerous surgical approaches as wells various surgical techniques like open & closed reduction etc(İlgüy et al. 2017)

After discussing with undergraduate students at the end of a conventional lecture class about all other surgical techniques of management of Zygomatico -Maxillary Complex (zmc) fracture., I decided to apply MILA teaching methodology for one specific surgical technique for better clarity and to avoid confusion.

I realised activity-based learning will make them imbibe the topic. I decided to proceed with Medical Imitation/(Simulation) Learning Activity(MILA) (whereas MIIA actually stands for MULTIPLE INTERACTIVE

LEARNING ALGORITHM), for a specific topic namely “ Gilles method of Closed Reduction of Zygomatic arch fracture” I utilised the” Simulated based learning” method in on a topic namely’ Gilles Temporal approach of reducing the zygomatic arch fracture(Fig-5)(Sweeney 2012).

The protocol /steps included:-

I) Simulation of surgical technique step by step using routine materials or props available in our department or clinic namely as follows:-

- a) modelling dental wax sheet.
- b)Rubber dam.
- c)adhesive tape,
- d)BP Handle no 3.
- e)BP blade no 15
- f)resin skull model with mandible articulated

II) After Simulation -activity being demonstrated to all undergraduate students, Students were divided, two groups., where every one of either group actively participated and demonstrated at least one step of simulated surgical activity.

At the end of the activity, there was an overwhelming response from the students in both groups. Students in both groups felt a better understanding of the above topic because of simulated hand on surgical technique.

Overall, I believe teaching students by this method was found effective for teaching topic namely “GILLES METHOD OF CLOSED REDUCTION OF ZYGOMATIC ARCH FRACTURE”. I believe if the same sort of activity-based learning method (i.e. like MILA)will improve students' learning aspects in maxillofacial surgery. As a faculty, I felt happy when those students were able to understand and respond correctly to questions being asked at the end of the lecture session.

THE LEARNING CURVE IN MY CARRIER:-

During my post-graduation in omfs , Junior resident -(academics) (@MGPGI)was the designation given to me because, It was my routine schedule to teach undergraduate third and final year BDS where even all other specialities junior residents along with my self taught the conventional chalk and board with a PowerPoint presentation. After joining as a faculty in SIMATS my perspective towards teaching students has entirely changed.

I have learned a new methodology of teaching which can reach students easily and also students friendly. hence I would rather say " MILA" as a milestone in my teaching career.

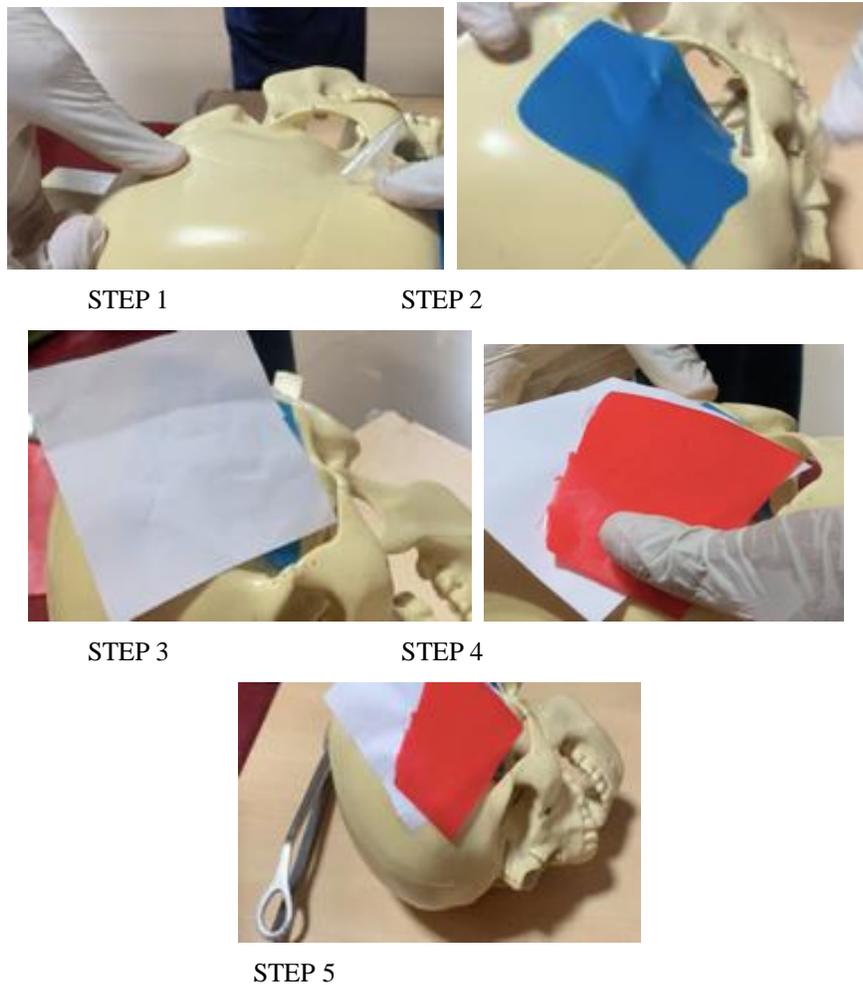
FUTURE PERSPECTIVE OF MILA:-

Observation-based learning for undergraduate students in omfs curriculum -a promising future methodology of learning ?!

Undergraduate, as well as Postgraduate in dentistry, learn and implicate their surgical skill only after observing as well as assisting surgical procedure done by faculty. Henceforth undergraduate especially while learning complicated or difficult maxillofacial surgery topic will be able to orient to the topic if those students observe cases related to the topic in operation theatre while being operated in operation theatre or through audiovisual -aid in

classes itself in near future. During the internship, a student can observe and assist which is often super -exciting for student in maxillofacial surgery post-operative ward also preoperative surgical preparation to get an overall idea of how a patient is being as inpatient since most of the dental treatment is done as outpatient or day care basis only.(Sweeney 2012; Agha et al. 2005)

Figure-5: Picture showing stepwise (step-1 to 9) from incision to dissection of SCALP layer with final elevation of zygoma using rowe's elevator.





STEP 6



STEP 7



STEP 8



STEP 9

MILA in teaching Orthognathic Surgeries

Orthognathic surgeries are usually one of the customary and routine procedures in the field of oral and maxillofacial surgery. Though it appears to be a difficult subject to understand and perform, knowledge on proper assessment, clinical judgement and skills can make it extremely simpler. Undergraduate students have difficulty in understanding the diagnosis of skeletal malocclusion and assessing using cephalometric analysis and choice of surgical procedure.

We in our institution teach students without box training. The protocol included preliminary flipped class teaching and textbook reading. This was followed by each student making diagnosis using cephalometric radiographs and the adjoining anatomical structures, including the second molar, mandible and inferior alveolar canal, Lingual nerve. Then each of them were asked to make the cuts which are done in Bilateral sagittal split osteotomy. This was supervised and checked individually by the instructor. Following this, keeping an open textbook to cross check the classification of malocclusion and various maxillary and mandibular orthognathic procedures. Along with this the tracing of cephalometric and knowing predominant points to do better orthognathic results

Having completed the above exercise, the discussion was now focussed on diagnosis and treatment planning. The decisions the student had to make were how to prepare the mock surgery models, to know interpretation of cephalometric radiographs and come to conclusive diagnosis of malocclusion, the choice of incision, the need for removal of third molar in case of bilateral sagittal split osteotomy, the pattern of bone cutting, the technique of bone splitting, plating system. Although the indications and classification can be consistent, diagnosis and treatment planning may have variations (Hill et al. 2003). Hence, the answers to the above questions were written out and again discussed with the faculty and explanations were given with reasoning.

When the theoretical concepts are well understood, hands-on pedagogy is implemented. Hands-on operations have been associated with the stages of developmental theory. When students are exposed to activities that engage the minds with concrete things and perform with hands, the knowledge provided becomes trustworthy and re emphasised with long lasting memory (Kyerere 2017). Students are trained to feel and cut bone on cadaveric mandibles to simulate real patients.

The experience of bone cutting, bone splitting and plating and screw fixation on the natural or acrylic bone model gives the student an inner confidence and enhances their interest in the subject. There has been a dramatic increase in student understanding, case diagnosis and treatment planning. This is evident in their everyday clinical case judgements, answer papers and interest to explore their postgraduate colleagues acts in OT.

Overall, we believe teaching students by model surgeries with natural bone or STL models is effective for teaching orthognathic surgery and most surgical procedures.

Conclusion:

This approach of teaching students is found to be very effective in understanding very difficult topics. Small group teaching helps in concentrating on each and every individual and students are less distracted, whereas lecturing to larger groups makes it difficult to concentrate on students with less receptive skills. MILA provides an equal opportunity for all students to take part in the discussion which is also coupled with activity which will make lecture classes more of an interactive session rather than being uneventful.

BIBLIOGRAPHY

- Agha, R. A., A. Papanikitas, M. Baum, and I. S. Benjamin. 2005. "The Teaching of Surgery in the Undergraduate Curriculum. Part II – Importance and Recommendations for Change." *International Journal of Surgery*. <https://doi.org/10.1016/j.ijssu.2005.03.016>.
- Ali, K., A. McCarthy, J. Robbins, E. Heffernan, and L. Coombes. 2014. "Management of Impacted Wisdom Teeth: Teaching of Undergraduate Students in UK Dental Schools." *European Journal of Dental Education: Official Journal of the Association for Dental Education in Europe* 18 (3): 135–41.
- Bowe, Constance M., John Voss, and H. Thomas Aretz. 2009. "Case Method Teaching: An Effective Approach to Integrate the Basic and Clinical Sciences in the Preclinical Medical Curriculum." *Medical Teacher* 31 (9): 834–41.
- Burdurlu, Muammer Çağrı, Fatih Cabbar, Volkan Dağaşan, Zeynep Gülen Çukurova, Özge Doğanay, Gül Merve Yalçın Ülker, Berkem Atalay, Onur Gönül, and Ceyda Özçakır Tomruk. 2020. "A City-Wide Survey of Dental Students' Opinions on Undergraduate Oral Surgery Teaching." *European Journal of Dental Education: Official Journal of the Association for Dental Education in Europe* 24 (2): 351–60.
- Danda, Anil Kumar, M. R. Muthusekhar, Vinod Narayanan, Mirza F. Baig, and Avinash Siddareddi. 2010. "Open versus Closed Treatment of Unilateral Subcondylar and Condylar Neck Fractures: A Prospective, Randomized Clinical Study." *Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons* 68 (6): 1238–41.
- Danda, Anil Kumar, Murali Krishna Tatiparthi, Vinod Narayanan, and Avinash Siddareddi. 2010. "Influence of Primary and Secondary Closure of Surgical Wound After Impacted Mandibular Third Molar Removal on Postoperative Pain and Swelling—A Comparative and Split Mouth Study." *Journal of Oral and Maxillofacial Surgery*. <https://doi.org/10.1016/j.joms.2009.04.060>.
- Dollar, Anna, Ronald Ulseth, and Paul Steif. n.d. "Blending Interactive Courseware into Statics Courses and Assessing the Outcome at Different Institutions." *2011 ASEE Annual Conference & Exposition Proceedings*. <https://doi.org/10.18260/1-2--17572>.
- Ezhilarasan, Devaraj, Velluru S. Apoorva, and Nandhigam Ashok Vardhan. 2019. "Syzygium Cumini Extract Induced Reactive Oxygen Species-Mediated Apoptosis in Human Oral Squamous Carcinoma Cells." *Journal of Oral Pathology & Medicine: Official Publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology* 48 (2): 115–21.
- Fidele, Nyimi Bushabu, Zhao Yifang, and Bing Liu. 2019. "The Changing Landscape in Treatment of Cystic Lesions of the Jaws." *Journal of International Society of Preventive and Community Dentistry*. https://doi.org/10.4103/jispcd.jispcd_180_19.
- Gopalakannan, S., T. Senthilvelan, and S. Ranganathan. 2012. "Modeling and Optimization of EDM Process Parameters on Machining of Al 7075-B4C MMC Using RSM." *Procedia Engineering* 38 (January): 685–90.
- Govindaraju, Lokhasudhan, Prasanna Neelakantan, and James L. Gutmann. 2017. "Effect of Root Canal Irrigating Solutions on the Compressive Strength of Tricalcium Silicate Cements." *Clinical Oral Investigations* 21 (2): 567–71.
- Hill, John M. D., Clark K. Ray, Jean R. S. Blair, and Curtis A. Carver. 2003. "Puzzles and Games." *ACM SIGCSE Bulletin*. <https://doi.org/10.1145/792548.611964>.
- İlgüy, Dilhan, Mehmet İlgüy, Zehra Semanur Dölekoğlu, Nilüfer Ersan, and Erdoğan Fişekçioğlu. 2017. "Evaluation of Radiological Anatomy Knowledge among Dental Students." *Yeditepe Dental Journal*. <https://doi.org/10.5505/yeditepe.2017.49140>.
- Iwanaga, Joe, Koichi Watanabe, Mahindra Kumar Anand, and R. Shane Tubbs. 2020. "Air Dissection of the Spaces of the Head and Neck: A New Teaching and Dissection Method." *Clinical Anatomy* 33 (2): 207–13.
- Kember, David. 2009. "Promoting Student-Centred Forms of Learning across an Entire University." *Higher Education*. <https://doi.org/10.1007/s10734-008-9177-6>.
- Kember, David, Doris Y. P. Leung, and K. P. Kwan. 2002. "Does the Use of Student Feedback Questionnaires Improve the Overall Quality of Teaching?" *Assessment & Evaluation in Higher Education*. <https://doi.org/10.1080/0260293022000009294>.
- Kumar, Muthusamy Senthil, Gelli Vamsi, Ramasamy Sripriya, and Praveen Kumar Sehgal. 2006. "Expression of Matrix Metalloproteinases (MMP-8 and -9) in Chronic Periodontitis Patients with and without Diabetes Mellitus." *Journal of Periodontology* 77 (11): 1803–8.
- Kyere, John. 2017. "Effectiveness of Hands-on Pedagogy in STEM Education." *Walden Dissertations and Doctoral*

Studies.

- Lammers, William J., and John J. Murphy. 2002. "A Profile of Teaching Techniques Used in the University Classroom." *Active Learning in Higher Education*. <https://doi.org/10.1177/1469787402003001005>.
- Lee, Jessica S., Roseanna Graham, Jennifer P. Bassiur, and Richard M. Lichtenthal. 2015. "Evaluation of a Local Anesthesia Simulation Model with Dental Students as Novice Clinicians." *Journal of Dental Education* 79 (12): 1411–17.
- Leung, Doris Y. P., and David Kember. 2006. "The Influence of Teaching Approach and Teacher-Student Interaction on the Development of Graduate Capabilities." *Structural Equation Modeling: A Multidisciplinary Journal*. https://doi.org/10.1207/s15328007sem1302_6.
- McCoy, Lise, Robin K. Pettit, Charlyn Kellar, and Christine Morgan. 2018. "Tracking Active Learning in the Medical School Curriculum: A Learning-Centered Approach." *Journal of Medical Education and Curricular Development*. <https://doi.org/10.1177/2382120518765135>.
- Mehta, Meenu, Deeksha, Devesh Tewari, Gaurav Gupta, Rajendra Awasthi, Harjeet Singh, Parijat Pandey, et al. 2019. "Oligonucleotide Therapy: An Emerging Focus Area for Drug Delivery in Chronic Inflammatory Respiratory Diseases." *Chemico-Biological Interactions* 308 (August): 206–15.
- Milne, S., E. G. Walshaw, A. Webster, and C. J. Mannion. 2020. "Active Learning in Head and Neck Trauma: Outcomes after an Innovative Educational Course." *The British Journal of Oral & Maxillofacial Surgery*, July. <https://doi.org/10.1016/j.bjoms.2020.05.003>.
- Neelakantan, P., C. Subbarao, C. V. Subbarao, G. De-Deus, and M. Zehnder. 2011. "The Impact of Root Dentine Conditioning on Sealing Ability and Push-out Bond Strength of an Epoxy Resin Root Canal Sealer." *International Endodontic Journal* 44 (6): 491–98.
- Neelakantan, P., A. A. Varughese, S. Sharma, C. V. Subbarao, M. Zehnder, and G. De-Deus. 2012. "Continuous Chelation Irrigation Improves the Adhesion of Epoxy Resin-Based Root Canal Sealer to Root Dentine." *International Endodontic Journal* 45 (12): 1097–1102.
- Panda, Saurav, Jayakumar Doraiswamy, Sankari Malaiappan, Sheeja Saji Varghese, and Massimo Del Fabbro. 2016. "Additive Effect of Autologous Platelet Concentrates in Treatment of Intrabony Defects: A Systematic Review and Meta-Analysis." *Journal of Investigative and Clinical Dentistry* 7 (1): 13–26.
- Parmelee, Dean X., and Patricia Hudes. 2012. "Team-Based Learning: A Relevant Strategy in Health Professionals' Education." *Medical Teacher*. <https://doi.org/10.3109/0142159x.2012.643267>.
- Pippi, R. 2014. "Evaluation Capability of Surgical Difficulty in the Extraction of Impacted Mandibular Third Molars: A Retrospective Study from a Post-Graduate Institution." *Annali Di Stomatologia*. <https://doi.org/10.11138/ads/2014.5.1.007>.
- Praveen, K., V. Narayanan, M. R. Muthusekhar, and M. F. Baig. 2001. "Hypotensive Anaesthesia and Blood Loss in Orthognathic Surgery: A Clinical Study." *The British Journal of Oral & Maxillofacial Surgery* 39 (2): 138–40.
- Prince, Michael. 2004. "Does Active Learning Work? A Review of the Research." *Journal of Engineering Education*. <https://doi.org/10.1002/j.2168-9830.2004.tb00809.x>.
- Ramadurai, Neeraja, Deepa Gurunathan, A. Victor Samuel, Emg Subramanian, and Steven J. L. Rodrigues. 2019. "Effectiveness of 2% Articaine as an Anesthetic Agent in Children: Randomized Controlled Trial." *Clinical Oral Investigations* 23 (9): 3543–50.
- Sajan, D., K. Udaya Lakshmi, Y. Erdogdu, and I. Hubert Joe. 2011. "Molecular Structure and Vibrational Spectra of 2,6-Bis(benzylidene)cyclohexanone: A Density Functional Theoretical Study." *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*. <https://doi.org/10.1016/j.saa.2010.09.007>.
- Samuel, Srinivasan Raj, Shashidhar Acharya, and Jeevika Chandrasekar Rao. 2020. "School Interventions-Based Prevention of Early-Childhood Caries among 3-5-Year-Old Children from Very Low Socioeconomic Status: Two-Year Randomized Trial." *Journal of Public Health Dentistry* 80 (1): 51–60.
- Sathivel, Arumugam, Hanumantha Rao Balaji Raghavendran, Periasamy Srinivasan, and Thiruvengadam Devaki. 2008. "Anti-Peroxidative and Anti-Hyperlipidemic Nature of Ulva Lactuca Crude Polysaccharide on D-Galactosamine Induced Hepatitis in Rats." *Food and Chemical Toxicology: An International Journal Published for the British Industrial Biological Research Association* 46 (10): 3262–67.
- Stacey, D. Heath, D. Heath Stacey, John F. Doyle, Delora L. Mount, Mary C. Snyder, and Karol A. Gutowski. 2006. "Management of Mandible Fractures." *Plastic and Reconstructive Surgery*. <https://doi.org/10.1097/01.prs.0000209392.85221.0b>.
- Susarla, Srinivas M., and Thomas B. Dodson. 2005. "How Well Do Clinicians Estimate Third Molar Extraction

Difficulty?" *Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons* 63 (2): 191–99.

Sweeney, W. Brian. 2012. "Teaching Surgery to Medical Students." *Clinics in Colon and Rectal Surgery* 25 (3): 127–33.

Zappe, Sarah, Robert Leicht, John Messner, Thomas Litzinger, and Hyeon Woo Lee. n.d. "'Flipping' The Classroom To Explore Active Learning In A Large Undergraduate Course." *2009 Annual Conference & Exposition Proceedings*. <https://doi.org/10.18260/1-2--4545>.