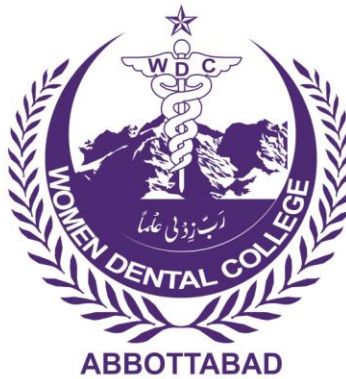


Women Dental College, Abbottabad



Lab Manual

ORTHODONTIC DEPARTMENT

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Introduction

The purpose of the orthodontic laboratory is to support the acquisition of clinical skills through hands-on training within a non-threatening environment. Learners commonly practice the procedural skills' psychomotor component under the trainers' instruction, who have previously demonstrated the relevant skill.

Subsequently, the skills are then performed by the learners themselves under supervision.

Aims and Objectives:

Aims:

1. **Enhance Practical Skills:** Develop hands-on expertise in the design, creation, and fitting of orthodontic devices, including removable appliances, retainers, positioners.
2. **Ensure Precision:** Achieve high levels of accuracy in fabricating orthodontic appliances to ensure proper fit, function, and aesthetic appeal.
3. **Understand Materials:** Gain a thorough understanding of the properties and applications of various materials used in orthodontics to select the most suitable options for each case.
4. **Promote Patient Care:** Equip students and technicians with the skills to produce orthodontic appliances that improve patient comfort, function, and appearance, thereby contributing to overall oral health and quality of life.

Objectives:

1. **Master Fabrication Techniques:** Learn and apply step-by-step procedures for the accurate fabrication of springs, loops, clasps and orthodontic appliances.
2. **Analyze and Troubleshoot:** Identify common issues in orthodontic appliance design and fabrication, and apply troubleshooting techniques to resolve them effectively.
3. **Adhere to Standards:** Follow established protocols and best practices to ensure the quality and consistency of orthodontic appliances.
4. **Integrate Theory and Practice:** Bridge the gap between theoretical knowledge and practical application in orthodontics, enhancing overall competency in the field.

Faculty Responsible for Course Conduction:

Serial. No	Faculty	Department	Designation
01	Prof. Dr. Nabila Anwar	Orthodontics	HOD/Professor
02	Dr. Jawad Ullah Shah	Orthodontics	Lecturer

Laboratory Staff

Serial. No	Name	Laboratory	Designation
01	Saif Ullah	Orthodontic Lab	Lab Technician
02	Faisal	Orthodontic Lab	Lab Technician

Laboratory Tutorials in General

1. Introduction

- **Overview:** This introductory session familiarizes students with the lab environment and protocols.
- **Objectives:**
 - Understand lab safety procedures and emergency protocols.
 - Identify and learn the use of essential lab equipment and materials.
- **Content:**
 - **Lab Safety Guidelines:** Proper attire (lab coats, gloves, safety glasses), emergency exits, and first aid.
 - **Equipment Overview:** Introduction to lathes, handpieces, micromotor etc.
 - **Material Handling:** Overview of common materials (acrylic, round stainless steel wire) and their storage requirements.
 - **Basic Procedures:** Cleanliness, organization, and handling of tools and materials.

2. Material Handling and Preparation

- **Overview:** Learn how to handle and work with dental materials for use in orthodontic appliance fabrication.

- **Objectives:**
 - Gain proficiency in handling, and bending stainless steel wire, and other various materials.
- **Content:**
 - **Types of Materials:**
 - **Plaster:** Cast fabrication.
 - **Resins:** Acrylics (for appliance fabrication).
 - **Stainless Steel wires:** (for TPA, clasps, loops, metal frameworks).
 - **Mixing Techniques:** Use of vacuum mixers and manual mixing methods.
 - **Handling:** Avoid contamination, use appropriate mixing tools.
 - **Storage and Disposal:** Proper storage conditions and waste disposal methods.

3. Preparing Impressions

- **Overview:** Techniques for obtaining accurate study models.
- **Objectives:**
 - Master the process of model preparation.
- **Content:**
 - **Model Preparation:** Pouring plaster or stone, trimming models.

4. Fabrication of Orthodontic Appliances

- **Overview:** Steps involved in appliance fabrication.
- **Objectives:**
 - Learn the full process from impression to final fitting.
- **Content:**
 - **Impression Taking**
 - **Wire Work:** Creating a framework, clasp or active component.
 - **Acrylic coverage:** Using acrylic base for better retention.
 - **Finishing and Adjustments:** Polishing and fitting the orthodontic appliance.

5. Pre-Surgical Naso-Alveolar Molding Appliance:

- **Overview:** Fabrication of PNAM appliance for Maxillofacial Cleft Defects
- **Objectives:**
 - Develop skills for creating PNAM appliance.
- **Content:**
 - **Design Considerations:** Customizing appliance to match patient anatomy.
 - **Material Selection:** Using biocompatible materials.
 - **Fitting and Adjustment:** Ensuring comfort.

6. Quality Control and Troubleshooting

- **Overview:** Techniques for ensuring the accuracy and quality of appliances.
- **Objectives:**
 - Identify and resolve common issues in appliance fabrication.
- **Content:**
 - **Fit and Function Checks:** Assessing and adjusting appliance for proper fit.
 - **Common Problems:** Identifying issues such as misfit or occlusal discrepancies.

- **Troubleshooting Techniques:** Practical solutions for common fabrication problems.
- **Refinement Techniques:** Adjustments and refinements for optimal results.

7. Patient Communication and Care

- **Overview:** Best practices for interacting with patients regarding appliances.
- **Objectives:**
 - Improve communication skills and patient management.
- **Content:**
 - **Patient Consultation:** Discussing appliance options and expectations.
 - **Handling Feedback:** Addressing patient concerns and making adjustments.
 - **Post-Procedure Care:** Providing instructions for maintenance and care of appliance.

These detailed tutorials provide a comprehensive guide for mastering the skills required in a orthodontics lab, ensuring proficiency in both traditional and modern techniques for creating high-quality orthodontic appliance.

Safety Guidelines for the Orthodontics Laboratories

1. Personal Protective Equipment (PPE):

- **Wear Lab Coats:** Always wear a lab coat to protect your clothing and skin from chemicals and debris.
- **Use Safety Glasses:** Protect your eyes from dust, particles, and splashes.
- **Gloves:** Use gloves to handle materials and avoid direct skin contact with chemicals and potentially hazardous substances.
- **Masks:** Wear masks to prevent inhalation of dust and fumes, especially when working with materials that generate fine particles or volatile substances.

2. Chemical Safety:

- **Proper Storage:** Store chemicals and dental materials according to manufacturer instructions, in well-ventilated areas, and away from heat sources.
- **Handle with Care:** Read and follow the Safety Data Sheets (SDS) for all materials used. Avoid direct skin and eye contact with chemicals.
- **Dispose of Waste Properly:** Follow lab protocols for the disposal of chemical waste and other hazardous materials. Use designated containers for different types of waste.

3. Equipment Safety:

- **Inspect Regularly:** Regularly check equipment for damage or wear and ensure it is functioning correctly before use.
- **Use as Intended:** Operate equipment according to manufacturer guidelines and training. Avoid improvising or using equipment for unintended purposes.
- **Maintain Cleanliness:** Keep work surfaces and equipment clean and organized to prevent accidents and contamination.

4. Fire and Emergency Procedures:

- **Know Emergency Exits:** Familiarize yourself with the lab's layout, including the locations of emergency exits and fire extinguishers.
- **Report Hazards:** Immediately report any spills, leaks, or safety hazards to the lab supervisor.
- **Follow Protocols:** Adhere to established fire and emergency protocols, including evacuation procedures and the use of safety equipment.

5. Ergonomics and Physical Safety:

- **Proper Posture:** Maintain correct posture and use ergonomic equipment to prevent strain and injury during prolonged lab work.
- **Lift Safely:** Use correct lifting techniques to avoid back injury when handling heavy materials or equipment.
- **Stay Alert:** Avoid distractions and stay focused while working to reduce the risk of accidents and mistakes.

6. Hygiene and Cleanliness:

- **Hand Washing:** Wash hands thoroughly after handling materials, chemicals, or equipment, and before eating or touching your face.
- **Clean Work Areas:** Regularly clean and disinfect work surfaces and tools to maintain a sanitary lab environment.
- **Avoid Eating or Drinking:** Do not eat or drink in the lab to prevent contamination and exposure to hazardous substances.

7. Training and Compliance:

- **Complete Training:** Ensure that you have received proper training in lab safety procedures and the use of equipment before working in the lab.
- **Follow Guidelines:** Adhere strictly to all safety guidelines and protocols established by the lab and regulatory bodies.

By following these safety guidelines, you can help maintain a safe and efficient working environment in the orthodontics lab, ensuring both personal well-being and the integrity of your work.

List of Equipment and Materials for a Orthodontic Lab

1. Equipment:

- **Dental Lathes:**
 - **Purpose:** For polishing and finishing orthodontic appliances.
 - **Details:** Includes various attachments such as buffing wheels and brushes.
- **Dental Handpieces:**
 - **Purpose:** To cut, shape, and finish dental materials.
 - **Details:** High-speed and low-speed handpieces with various burs and tips.
- **Trimming Units:**
 - **Purpose:** For trimming and adjusting study and working cast.

- **Details:** Includes equipment for precision cutting and grinding.
- **Vacuum Former:**
 - **Purpose:** To fabricate Essix retainer.
 - **Details:** Features a vacuum system to ensure bubble free Essix retainer.
- **Articulators:**
 - **Purpose:** To simulate the jaw movements and occlusion for accurate presurgical splint fabrication.
 - **Details:** Adjustable models to replicate various bite conditions.
- **Micromotor Units:**
 - **Purpose:** For precise adjustment and finishing of orthodontic appliances.
 - **Details:** Includes handpieces with adjustable speed and torque.
- **Welder:**
 - **Purpose:** For soldering of orthodontic appliance components.
 - **Details:** Includes solder wire for soldering cleats onto trans palatal arches
- **Vibrator:**
 - **Purpose:** To mix dental materials like gypsum or resins without air bubbles.
 - **Details:** Ensure thorough mixing.
-

2. Materials:

- **Acrylic Resins:**
 - **Purpose:** For constructing orthodontic and PNAM appliance.
 - **Details:** Includes cold-cured resins.
- **Impression Materials:**
 - **Purpose:** To create accurate duplication of casts and dies.
 - **Details:** Includes alginate, polyvinyl siloxane (PVS), Agar, and polysulfide materials.
- **Gypsum Products:**
 - **Purpose:** For creating dental models and casts.
 - **Details:** Includes dental plaster, stone, and high-strength stone.
- **Polishing Materials:**
 - **Purpose:** For finishing and polishing appliances.

- **Details:** Includes polishing powders, brushes, and abrasive discs.
- **Waxes:**
 - **Purpose:** For making patterns and adjusting construction bite.
- **Plaster Spatulas and Mixing Bowls:**
 - **Purpose:** For mixing and handling plaster and other materials.
 - **Details:** Includes stainless steel or plastic spatulas and mixing bowls.

This comprehensive list ensures that a orthodontic lab is well-equipped to handle the various tasks involved in fabricating high-quality orthodontic appliances, supporting both precision and efficiency in orthodontic treatment.



SELECTED EQUIPMENT

STANDARD OPERATING EQUIPMENTS

1.MICROMOTOR

CHECK LIST:

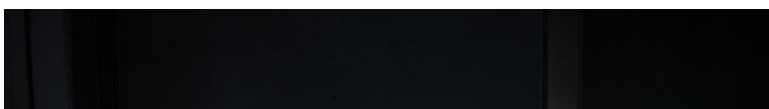
- Check the mode (hands free, leg control)
- Check the cord
- Check the motor before attaching the hand piece
- Check whether the bur is moving in the hand piece



DURING OPERATION:

- Switch on
- Set to the desired speed
- Switch over to the mode you want
- Run with copious irrigation
- Clean the outer surface with spirit

2. LATHE MACHINE



- Plug the wire cable of the lathe in the electric socket.
- Loosen the trimmer holding mantrel in anti-clockwise direction.
- Insert the desired trimmer in the holding mantrel and rotate in clockwise direction.
- Firmly rotate the holding mantrel to check whether the trimmer is locked properly.
- Switch on the lathe and perform the trimming work.
- After the use, switch off the lathe and remove the trimmer by rotating the holding mantrel in anti-clockwise direction.

CAUTION:

- Wear protective face mask to avoid the particle dust/acrylic dust.
- Wear head cap.
- Do not attempt to stop the machine with hand while running.

3. MODEL TRIMMER



BEFORE OPERATION:

- Before operating the Model Trimmer make sure the water flow valve is open
- If water flow not adequate or no water supply, strictly do not operate the Model Trimmer

DURING OPERATION:

- Switch on
- Wait for the trimmer to pick up ideal speed
- Place the model and move the model towards the disk gently
- If the disk is not wet there is no water supply. Do not operate if the disk is dry

AFTER OPERATION:

- Flush with water to prevent plaster buildup and clogging
- At the end of each use allow the motor to remain on and open the water adjustment to maximum of about 20 seconds
- Turn the water off and allow the motor to run for an additional 10 seconds

- Wipe and clean the exterior of the model trimmer at the end
- Wear protective face mask to avoid the particle dust. Wear head cap

4. VACCUM FORMING MACHINE



- Swing the heating unit fully to the rear and turn on the heating element switch.
- Preheat the machine for approx. 3 minutes.
- Place the cast inside the vacuum machine on the vacuum plate.
- Raise the hinged frame. Open the hinged frame using the handle provided and place a sheet of plastic within the frame center carefully.

- Close the frame and secure with the frame latch swing the heating unit into position squarely over the material.
- Observe the plastic as it heats. Watch for sag depth.
- Turn on vacuum, then firmly lower the plastic over model.
- Push plastic into the under cuts of model. Let the vacuum run until the plastic encased model is cool.
- Open the release handle and remove the thermoformed plastic from the vacuum machine.

CAUTION:

- Move heating unit only by the handle provided.
- Do not leave the machine unattended while heating plastic

5. VIBRATOR



- the knob on of the vibrator
- Check for air bubbles
- Keep Place the mould or impression over the mate table on the vibrator
- Connect the plug in the electric socket
- Switch on the power button
- Pour the mould or impression with the desired gypsum product

- Turn vibrating until the individual is satisfied with no air bubbles
- Switch off the knob and power button

CAUTIONS:

- Clean the mat table after every use
- Hold the mould or impression in hand while in use

6. SPOT WELDER



- Proper electrode for the thickness or shape of the material to be welded is selected
- A broad electrode is used for thin materials and a narrow one for thick materials
- Electrodes of the welder are cleaned so as to remove any carbide participate surface of electrode should be smooth flat and perpendicular to its long axis
- Electrode should be in total contact if not they should be filled until total contact is achieved
- A timer is set to the required reading
- Metals to be joined are placed between two electrodes and the switch is turned on
- The electrode pressure can be maintained for a few seconds to obtain a good joint

SCAUTION:

- Always wear safety glasses

Keep inflammable materials away from the machine



**CURRICULUM MAP
FOR
ORTHODONTIC LAB
WOMEN DENTAL COLLEGE ABBOTTABAD**

Objectives & Learning Strategies/TOS:

S.No.	Topic	Learning Outcomes	Teaching Hours	Mode of Teaching	Assessment Tools
01	wire bending	<ul style="list-style-type: none"> •Construct different components of appliances i.e Adam's clasp, labial bow • Explain the purpose of each component 	250	Demonstrations	OSCE
02	Cephalometry	<ul style="list-style-type: none"> • Illustrate cephalometric analysis. • Interpret cephalometric values. 			
03	Cast Analysis	<ul style="list-style-type: none"> •Illustrate Cast analysis • Interpret Cast analysis values. •Bolton Analysis for tooth size discrepancy 			
04	Appliance Fabrication	<ul style="list-style-type: none"> •Illustrate orthodontics appliances • Explain components of appliances and their function 			