TO THE POINT CLASS PRACTICALS

REGIONAL SURGERY (SURG 402) FINAL

Top Stories

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- **Management of Burn Wounds**
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FINAL CLASS PRACTICALS

COMPLETE

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Course offered by:

Department of Clinical Medicine & Surgery
Faculty of Veterinary Science
University of Agriculture
Faisalabad

Presented by:

MUHAMMAD SAJJAD HUSSAIN

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For Suggestions & Feedback: Contact: 0322 6272 278 Email: dvmdoctors@gmail.com

Arthrocentesis

"To administer the drug or collect synovial fluid from the joint"
It is valuable technique to localize pain in lameness. In modern equine medicine, it got more importance in intra-articular analgesia to localize the pain. Most of the veterinarian does not perform because they are fear of its after-maths after faulty technique.

Pre-requisites

a) Through knowledge of joint anatomy
b) Precision of the technique
c) Restraining of the animal i.e. horse

Practical Application

i) Drug administration

Certain drugs are used:

a) Sodium hyaloronate: used in synovitis
b) Corticosteroids
c) Antibiotics
d) Polysulfated Glycosaminoglycans (PSGAG)

It is used for degenerative joint disease; includes

- abnormal bone development
- instability of cartilage
- damage to the joint

PSGAG also known as cartilage protective agents and they inhibit and enzyme that cause breakage of cartilage within the joint. But they produce inflammation and thickness of the synovial fluid.

Most common of its application is to administer local anaesthetic into the joint cavity. Such local anaesthetics include:
- Mepivacaine HCl: preferred for intra-articular test
- Lidocaine HCl: also used as local anaethetic

Why Mepivacaine HCl is preffered?
Because it is relatively non-irritating and provides desensitization for long time duration.

Intra-articular Anaesthesia	**Regional Anaesthesia**
It is more precized in establishing a diagnosis for several reasons i.e. in case of regional anaesthesia location and distribution of sensory nerves in horses vary considerably and we will not aasure about the desensitization of area after administration anaesthetic agent.	We can only check desensitization by pricking any sharp object but it only verifies that skin is desensitized, due to which we will not assure about the joint desensitization. So as compared to regional anaesthesia, direct instillation or administration of local anaesthetics is for better.
Regional anaesthesia or regional nerve block may not help to localize the source of pain, if it is due to damage of internal structure of joint.	Regional anaesthesia cause gait problems and abnormalities.
In addition to ligaments, tendons and extra-articular bones, in the intra-articular anaesthesia, only focus is on that point which is involves in lameness	Regional anaesthesia: extensive administration of s/c drug leads to s/c inflammation. Swelling and skin necrosis also occur if local anaesthetic is irritant.

-----	Regional aesthesia does not allow examiner to exam joint…….

Significance:

Arthrocenetsis can be used to:

a) Verify or negate the intra-articular pain in lameness. To localize the pain, intra-articular anaesthesia is considered to be more suitable.
b) For collection of synovial fluid
   After collection of synovial fluid, its examination include:
   i) Gross examination
   ii) Sophisticated exam (i.e. culturing of synovial fluid for confirmation of pathogens, physical and chemical tests for composition of synovial fluid and its microscopic examination)
c) To administer radiographic contrast medicine or electrolyte solution.
d) To check communication between synovial structure and nearby wound. It also provides

Management of Horse

Methods of restraining of horse for arthrocentesis may vary with the:

i) Anticipated / actual behaviour of horse: if horse is cooperative, then easy handling. We should anticipate the problems rather than assuming that procedure is trouble free.
ii) Availability of experienced assistant
iii) Specific joint to be entered

Physical restraining:

For those horses which are willing to restraint , we can use lead shank and nose twitch.

For needle-shy horses, first cover the eyes, provide suitable calm condition, slow and quiet approach is the best.

Stock (like squeezed gate with movable gates on both sides) are also used in modern world to restrain the large wild animals. Stocks minimize the injury to veterinarian, so safe for vets but having hazards for animals.

Chemical restraining:

If we can not handle/restrain the animal by physical method then go for chemical restraining.

- Acetyl promazine: @ 0.044-0.088 mg/kg b.wt.
- Xylazine: @ 0.3-0.5 mg/kg b.wt.
- Detomidine (latest discovered anaesthetic): @ 20-40 µg/kg b.wt.
- Butorphenol: @ 0.04-0.2 mg/kg b.wt.

Note: sedation or tranquilizing does not reduce the degree of lameness.

Preparation of site for arthrocentesis

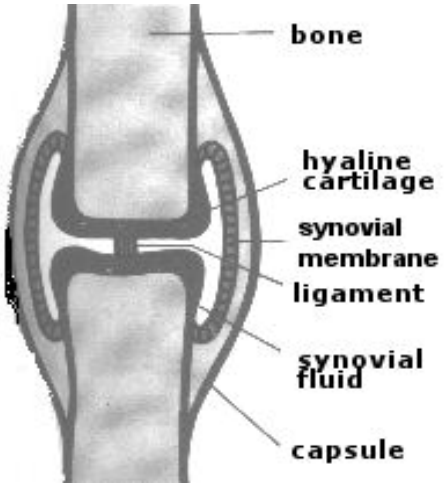
- Poor and dirty environment can complicate this practice e.g. include dust, crowded area. Such environment also poses to injury to the veterinarian and horse, simply.
- In case of horses, clipping is not preferred of that site. (because hairs are not much long or incision is not given in this case, so there is no chances of hair contamination)
- Area is scrub with antiseptic solution e.g. polyhexidine solution, povidone-iodine (pyodine) and chlorhexidine. It should be done for at least 7 minutes. Application of

antiseptic solution or soap should not be rinsed or washed until you ready to insert the needle.

- Wash the area with the 70% alcohol. Then excessive alcohol should cleaned from the site with sterile cotton gauze.
- If we are using 18 or 16 gauge needle to give local anaesthetic, this may cause pain to the horse. Therefore, use only 25 gauge needle.

General Technique

- Important point is "to insert the needle correctly".
- Relative anatomy of the joint is very important in this case.
- Perform the technique as quickly as possible.
- Pin insertion must be done in first attempt. Multiple attempts leads to the inflammation of that site and injury. But this inflammation will decrease with the passage of time.
- Clinician must determine the specific joint and site of entry relative to position of horse.
- Bore and length of the needle depends on the particular joint and size of the horse.
- Proper insertion of needle will depend on the handling shaft of the needle and palpation area.
- Then needle should insert into the cavity passing through skin with thrust without attaching it with the skin.
- To avoid broken needle, we should not use large size of needle. Depth of the needle penetration varies with the joint whether it is carpal, tibiotarsal or fetlock joint etc. In such joints, needle should inserted relatively superficially.
- Needle should be inserted 1-1.5 inches deep in case of coffin, elbow and pastern joints.
- Penetration of needle depends on the size of horse and joint type.



Most Accurate Indication of Entrance of Needle

- Most accurate indication of correct entry of needle is that synovial fluid oozes out through the needle. Sometime, fluid not ooze out, because of (reasons):
  a) Some joint normally contain less amount of synovial fluid.
  b) Needle is passed against the villi or cartilage
  c) There may be aspiration of villi, and fluid may not come out in the needle.
  d) Chronically inflamed joint may have less amount of synovial fluid.
  e) Hypertrophied villi and thickening of capsule provide less space and narrowing of cavity due to which there will be less fluid in the cavity.

- When fluid start oozing out, then attach the syringe with the needle and aspirate the fluid. Resistance to pressure on the plunger during aspiration is only the way to determine joint cavity was correctly approached.
- Some syringes that lock into the needle hub must be avoided during such procedure.

Precautions:

Needle should not be passed through inflamed or injured area.

Two points of injection strategies:

i) we should know about the multiple sites of entering on a single joint (if any part or site is inflamed or injured then we will approach the joint through other site/area).

ii) Ingress / egress portals for joint levage.

Fluid Therapy

Fluid therapy was first time introduced by Latta in 1831 (Scotland) and called it as life saving procedure. At that time, use of fluid therapy started to save the lives of people from cholera (in humans).

Types of Fluid Therapy

There are three types:

i) **Replacement therapy**:
It includes: blood transfusion, administration of blood products, water and electrolytes.

ii) **Supportive therapy**:
It includes: therapy of fluids with minerals, vitamins, electrolytes, glucose, dextrose, aminoacids, proteins and fats.

iii) **Adjuncive therapy**:
It means to treat any specific disorder or condition through fluid therapy:
e.g. For diuresis (it may be renal or extra-renal (called osmotic), we can administer a hypertonic solution. If there is excessive extravascular fluid, means edema developed, then we can administer a hypertonic solution.

Fluid therapy is very much important in the surgically dehydrated patients.

Normal Distribution of Water inside the Body

70% of the body is water (fluid). Out of which, 50% is intracellular fluid and remaining 20% is extracellular fluid. Further divission of extracelluar fluid is that: 15% is interstitial fluid and remaining 5% is intravascular or plasma.

Different Electrolytes in the Body

Cations:	Sodium (Na),
	Potassium (K)
	Calcium (Ca)
	Magnesium (Mg)
Anions:	Chloride (Cl)
	Bicarbonate
	Phosphorus (P)
	Proteins

Major extracellular cation is: Sodium (Na)
Major intracellular cation is: Potassium (K)

Major extracellular anion is: Chloride (Cl), Bicarbonates
Major intracellular anion is: Phosphorus (P), Proteins

Normal Sources of Water in the Body

i) Drinking water (via thirst) ii) Water in food iii) Metabolic water

Normal Sources of Water Loss from the Body

i) urine (Sensible loss) ii) Sweating iii) Respiration

a) Sensible loss (loss of water through urine): @ 12-24 ml/lb/day
b) Insensible loss (loss of water through feces, sweating and respiration): @ 10 ml/lb/day

Physical Control Mechanisms (to maintain zero water balance intake)

i) Thirst ii) Renal system iii) GIT mechanism iv) Metabolic water

- If there is loss of fluid and increase osmolality (means increased concentration s of salts) of the body fluid: then
  First defense mechanism of the body will be increase of thirst
  Second mechanism of the body will be decreased urine production (renal mechanism will activated).
- If this fluid loss/change is 1-2%, then it will be perceived by osmoreceptors of hypothalamus. Due to which, there will be production of ADH (vasopressin)
- There are three major mechanisms which try to compensate the circulatory volume:
  a) Sympathetic nervous system
  b) Angiotensin II
  c) Renal sodium excretion
- This volume depletion is sensed by arterial baroreceptors and sensed as hypotension.
- In response to this volume depletion, compensatory changes are as follows:
  a) Arterial vasoconstriction (which will lead to increase blood pressure).
  b) Venous constriction (leads to increased venous return)
  c) Increased myocardial contractility (results into increased cardiac output)
  d) Increased rennin secretions from the kidneys
  e) Increased tubular renal sodium reabsorption.

Types of Dehydration

In relation to loss of fluid and electrolytes, there are three types of dehydration:
i) Isotonic dehydration
ii) Hypotonic dehydration
iii) Hypertonic dehydration

i) **Isotonic dehydration:**
In this type of dehydration, water loss is equal to the sodium loss.

ii) **Hypotonic dehydration**;
Simply, hypotonic means decreased solute concentration in the solution, so in this type, loss of sodium is less than that of water.

iii) **Hypertonic dehydration**:
In this type, loss of water is less as compared to that of sodium.

Diagnosis of dehydration

There are various clinical techniques and methods used to know the extent of dehydration:

i) **Skin tenting or Skin pinch**: It is based on the elasticity of the skin. Loss of elasticity and flexibility of skin called turger, seen in dehydration.

ii) **Capillary refill time**: It must be 1-2 seconds of a normal healthy animal. Prolonged CRT gives an indication of dehydration.

iii) Examination of mucus membranes: dry oral mucus membranes give an indication of dehydration.

iv) If there is sever dehydration, then there will be sunken appearance of the eyes in the orbit.

Classification of Dehydration

It is on the basis of severity of dehydration.

a) < 5% dehydration
- Animal looks normal and no clear picture of dehydration at this stage.
- History of fluid loss and decreased water intake

b) 5 % dehydration:
- Dryness of the oral mucous membranes
- Tachycardia

c) 7 % dehydration:
- Mild skin turger
- Dry oral mucous membrane
- Tachycardia
- Pulse rate is normal

d) 10% dehydration
- Moderate skin turger
- Decreased pulse rate
- Tachycardia
- Dry mucous membrane

e) 12 % dehydration (peak of dehydration)
- Pronounced skin turger
- Significant signs of shock
- Dry mucous membrane
- Dilated pupil
- Coolness of body parts
- Eyes sunken in the orbits.

Routes of fluid administration

i) Oral ii) Subcutaneous (SC) iii) Intravenous (IV) iv) Intraperitoneal (IP)

i) **Oral**: Large volumes and high caloric fluids can be given. Give ORS which will increase the thirst of the animal and animal will compelled to take water.

ii) **Subcutaneous (SC**): only isotonic fluids are used. Demerits of this route are: a) we can not hypertonic solutions, they will cause irritation b) delayed absorption of the fluid c) only given in small volumes d) this route may not be adopted in large animals and even also in sheep and goat.
iii) **Intravenous (IV**): quick response can be obtained. Instant supply and no absorption.
iv) **Intraperitoneal (IP**): maximum absorption, and large volume of fluids can be given. There are chances of peritonitis.

Determination of amount of fluid to be given

Formula for amount of fluid:
= % dehydration / 100 x body weight of the animal = (liter)
For example: a dog of body weight 15 kg presents 7 % dehydration, calculate the fluid volume to be given.

7/100 x 15 = 1.05 liter = 1050 ml or approx. 1050 ml

Fluid in ml / kg of body weight = 1050 / 15 = 70 ml / kg
We can give fluid maximum to 80-90 ml / kg in dogs.
Amount of fluid for animal which is off feed with no severe signs of dehydration
= 40-50 ml/kg

Rate of Fluid:

Normal rate of fluid therapy (ml/kg/hour) = 15 ml/kg/hour
As 1 ml consists of about 16 drops of fluid,
So, Normal rate of fluid therapy (drops/kg/hour) = 15x16 drops/kg/hour
= 240 drops/kg/hour = 60 drops /kg/min

For a dog of 15 kg, Total volume to be given is 1050 ml @ 15 x 15 ml / hour = 225 ml/hour
= **225 ml/60 min** = **3.75 ml / min** = **60 drops /minute**

Complications of Fluid Therapy

i) Over hydration: increased urination thus increased loss of potassium (K^+)
ii) Edema: firstly in lungs (pulmonary edema may develop) and Chemosis: edema of conjunctive.
iii) Dilution of blood: blood cells damaged and may burst up.
iv) Particulate contamination: due to over expiry of the fluid. Mannitol®: some times crystal formed, if given as such, sudden death due to cardiac block.
v) Drug interaction: fluids with Ca^+ therapy should not be given with certain antibiotics such as: Ceftiofur Na^+, Tetracycline and with many other drugs. It forms precipitation/complex with the drug metabolites.

Epidural Anaesthesia

"Induction of local anaesthetic agent within the spinal cord but outside of dura meter.
If local anaesthetic agent is injected after crossing the dura meter, then it is sub-arachnoid or intra-thecal anaesthesia.
Local anaesthetic agent first desensitize the sensory nerves, then sacral nerves, parasympathetic nerves and then sympathetic nerves and at the end motor nerves.

Types of epidural anaesthesia

Based on the site where we are going to desensitize.

i) Caudal epidural anaesthesia
ii) Lumbosacral epidural anaesthesia

Here we will only discuss caudal epidural anaesthesia.

Caudal Epidural Anaesthesia

It desensitizes the half of the sacral region, anus, vulva, perineum region and then caudal aspect of the femoral region.

Indications:

- Prevention of straining
- Reduction of prolapsed vagina, uterus and rectum.
- Treatment of parturient injuries.
- Some obstetrical operations: such as fetotomy, amputation of tail.
- Urethrotomy
- Correction of crooked tail (bent tail)
- Correction of atresia anni and atresia recti. (atresia refers to small sized or absence of opening).
- Episiotomy: surgical cut at the opening of vagina to facilitate the child birth.

Epidural Anaesthesia in Cattle and Buffalo

There are two sites:

i) Sacro coccygeal space
ii) Inter coccygeal space

Inter-coccygeal space is preferred which is between 1^{st} and 2^{nd} coccygeal vertebrae. Sacro-coccygeal space is not preferred because ossification of sacrum occurs with the first intercoccygeal vertebrae.

Procedure:

- First obvious articulation behind the sacrum is 1^{st} intercoccygeal space. Hold the tail from the base and by moving it upward and downward, you may locate the space.
- Depression is located immediately behind the prominnat spine of 1^{st} coccygeal vertebrae.
- In cattle, another method is used to locate the 1^{st} inter-coccygeal space as follows: Draw a parallel line meeting both ischial tuberosities (point of buttock), on vertebral column, where this line passes, a point is taken above 10-12 cm from that joining point.
- Use 18 gauge needle with 1.5 inches length.
- Needle must be inserted via skin at an angle of 45. Reason: because anterior extremity of a vertebrae presents a protruded head and on posterior extremity, a shallow cavity. Due to protruded head. It is not possible to pass the syringe vertically.
- Penetrate the needle up to 2-4 cm depth.
- If needle mistakenly touching the bone during penetration, then withdraw the needle and correct the direction.
- When needle will reach the correct site, then there will be two indications:

- a) If hub of needle contains any drops of fluid, it will be sucked, because vacuum is present. b) Due to vacuum, there will be no resistant on the plunger.

Local Anaesthetic Agents

Lidocaine 2%
Xylocaine 2 %
Lignocaine 2 %

1ml / 100kg b.wt.
usually 4-5 ml in cattle and 5-6 ml is given to the buffalo.

Xylozine:

It can also use in epidural anaesthesia. It provides sedation for up to 3 hours. It should be administered @ 0.05 mg/kg b.wt.

Xylazine + Lidocaine:

@ 5 ml lidocaine + xylazine @ 0.03 ml/kg. It provided desensitization for about 100 minutes (1 ½ hours)

Antidot for xylazine: Tolazine and Yuhimbine.

Contraindications:

i) Damage to the lumber and sacral region
ii) Damage to the spinal cord
iii) Lameness of hind quarter
iv) Any stenotic process in vertebral column.

Advantages:

i) No effect on the fetus of a pregnant female.
ii) No respiratory assistance is required
iii) A single injection provides sufficient analgesia and sedation.
iv) Meningitis is less common than sub-arachnoid anaesthesia.

Disadvantages:

i) Anaesthesia achieved in longer time than IV administration (about 15-20 min)
ii) Loss of hind limb control --> animal may fall and results into injury on the back.
iii) Large doses may be toxic.

Management of Burn Wounds

Causes of Burns

a) Thermal injury or extreme high temperature
b) Electricity
c) Chemicals
d) Radiations

Classification

According to the cause of the burn wounds:

a) Thermal injury burns
b) Electric injury burns
c) Chemical injury burns
d) Radiation injury burns

According to the extent of damage:

a) Depth of injury (either partial or full thickness)

b) Surface area affected

Role of Nine

In small animals, this method is used to know rough estimate of surface area damaged in burns as follows as:

i) Each forelimb of body covers 9% of the body surface. (Total =18%)
ii) In case of hind limbs: dorsal and ventral surfaces of each hind limb cover 9 % of the body surface. (Total = 36%)
iii) Head and neck covers 9% of body surface
iv) Dorsal and ventral surface of trunk (include thorax and abdomen) cover 18% of the body surface. (Total = 36%)

So a total 18+36+9+36 = 99% is obtained.

Diagnosis of Burn Wounds (in Dogs and Cats):

Diagnosis is very difficult because blister formation is not common as seen in other animals. It is due to confirmation of skin (skin is covered with fine long hairs)

Burn wounds are characterized by: arrythema, transudation of fluid and epilated hair follicles.

In case of burns, we are not sure about the extent of tissue injury and death of the animal before 72 hours because body damage running very slow.

Transudation of Fluid:

It is due to the direct damage to the skin and walls of the vessels. High molecular weight albumen escapes from the vessels along with the fluid, thus transudation of fluid leads to fluid loss. (It is the plasma albumen loss along with fluid)

Loss of Erythrocytes (RBCs):

Blood loss occurs with the direct injury to the blood vessels, and RBCs start to run with the walls of the vessels. RBCs shrink and their cell membrane damages. Checkpoints (such as spleen and regional lymph nodes) for RBCs take such abnormal RBCs as immature RBCs and they are removed from the circulation. Thus a major loss of RBCs occurs in this fashion.

In case of sever blood loss; go for blood transfusion (after 5-7 days)

Because we can start the blood transfusion after observing the signs of blood loss (usually appear after 4-5 days due to slow body damage and fluid loss). So, it may be started after 5-7 days.

Electrolyte Loss:

i) Sodium (Na)

Normally lost with body fluid
Sodium has high affinity to denatured collagen
Na-K pump is damaged due to which there is nor regulation of sodium inside the body.

ii) Potassium (K)

Immediate hyperkalemia (due to damage of cells --> increased concentration of K^+)
Na-K pump is damaged, so no regulation of potassium.
IV fluid therapy

Treatment

i) Fluid support: Balance electrolyte, plasma replacement and colloidal fluids. But within first 24 hours, there should be no fluid therapy, until & unless animals show signs of hypovolemic shock.

ii) Analgesic agents:
Opoids, NSAIDs (Steroids should be avoided).
iii) Topical cooling: to reduce the pain.

Inhalation Injury

It is defined as thermal or chemical injury to the respiratory system. Heat regulation system of upper respiratory tract is very much efficient.

For example: Smoke inhalation (smoke of wood fire is the most toxic because it contains lethal and toxic gases like CO and aldehyde gases).

Treatment:

i) Oxygenation: provide oxygen supply to the affected animal to restore the respiration.
ii) Give bronchodilators
iii) Go for fluid therapy

Surgical Approach in Skin Burns

i) ***Surgical debridement***: Do as soon as possible. Edges of the damaged tissue must be cleared off so that healing process may start
ii) ***Removal of scab on wound***: remove scab so that healing of underlying tissue may start.

Debridement:

It is the removal of a dead, damaged or infected tissue to improve the healing potential of the remaining healthy tissue.

Types of debridement:

i) Surgical debridement (or aggressive debridement)
ii) Conservative debridement: including many techniques:
    a) Chemical debridement
    b) Wet dressing
    c) Hydrotherapy (done with water or any antiseptic solution like $KMnO_4$)

Bandages Techniques in Burns

Bandages used in burns are:

a) Dry bandages
b) Wet bandages
c) Wet to dry bandages

For small area burn, and if animal health status is normal, then we use wet to dry bandages.
In sever burns: wet bandage is used which has adhesive properties but not like benzoin co.
Wet dressing: helps to compensate the fluid loss and provides the environment to decrease the loss of fluid.

Biological Dressing:

Skin piece of animal after proper treatment is applied on the burn wounds, e.g., freeze dried porcine xenograft.
Use topical non-irritating antimicrobials.
Use silver preparations; especially have great importance in such burns; such preparation is silver-sulphadiazine available commercially.

Anaesthesia Techniques (*Delivered by* Dr. Misbah Ejaz)

General Anaesthesia:
Reversible depression of CNS reflexes.

Local Anaesthesia:
Technique to render part of the body insensitive to pain without affecting consciousness

Regional Anaesthesia:
To desensitize a relatively large part of the body e.g. limb. We desensitize the nerve from its origin that ultimately desensitizes the dependant part of the body.

Types of Regional Anaesthesia

i) **Mandibular/Alveolar nerve block**: to desensitize the lower jaw
ii) **Paralumber anaesthesia**: it desensitize the flank region, L-inverted may be. We block the last 3 thoracic and first two lumbar (L_1, L_2). Each nerve has two branches; i.e. dorsal and ventral.
iii) **Epidural anaesthesia**: above the dura meter. It can be given in two regions.
   a) Sacro-coccygeal space
   b) Inter coccygeal space (between 1st and 2nd coccygeal vertebrae).

   In bovine, both are used but in equines mostly inter-coccygeal space is preferred.
iv) **Aureco palpebral**: to desensitize the eyelid a) entropian b) ectropian
v) **Retrobulbar** (optic): to desensitize the eyeball.

Up To Date: 15 Jan 2010 – Saturday

Date Sheet For Final Theory Exam DVM 7th Semester
Winter Semester 2010-11

Date	Day	Course No.	Course Title
22-01-2011	Saturday	MICRO 404	Milk and Milk Products Inspection
25-01-2011	Tuesday	SURG 402	Regional Surgery
27-01-2011	Thursday	PARA 404	Meat Inspection
31-01-2011	Monday	MED 404	Systemic Medicine – I
02-02-2011	Wednesday	AR 402	Reproductive Biotechnology
07-02-2011	Monday	LM 404	Equine and Camel Production

Timing: 12:00 - 2:00 PM **Presented by:** Muhammad Sajjad Hussain