

FETOTOMY OPERATIONS

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(A) GENERAL CONSIDERATIONS:

Fetotomy is defined as those operations performed on the fetus for purpose of reducing its size by either its division or the removal of certain of its parts. In most cases these operations are performed within the uterus of the dam. Thus, fetotomy or embryotomy is "the dissection or dismemberment of a fetus." In fetotomy the life of the fetus is sacrificed if it is not already dead.

The term partial embryotomy is applied when division of a single part of the body of the fetus is sufficient to overcome the dystocia and the term total embryotomy is used when the foetal body has to be divided into several parts, usually extending from one end to the other. The term embryotomy has been long used and is erroneous by definition because the embryo stage is such a short period (12-14 days of gestation). Fetotomy is more appropriate term.

Indications of fetotomy operation:

1. After examination if it reveals the presence of a dead fetus, and a safe delivery obviously cannot be made by forced traction, the fetotomy should be initiated immediately. A common fault is the application of too great & too prolonged extractive forces before the decision is made to perform a fetotomy or caesarean section, or to avoid them is best be described as the approach of a "Calf Puller" which is not desirable.
2. Many dystocia require only partial fetotomy to make possible a safe and quick delivery, e.g. removal of limb while some requires total fetotomy e.g. monstrosities, too narrow pelvis of dam, gigantic fetus etc.
3. Complete fetotomy (total) may be required in dystocia caused by a variety of conditions, but generally oversized fetus.
 - (i) A relatively oversized fetus (fetus of normal size but maternal pelvis too small).
 - (ii) An absolutely oversized fetus (maternal pelvis of normal size but fetus abnormally large).
 - (iii) A pathologically enlarged fetus (fetus enlargement due to such conditions as fetal gigantism, fetal dropsy, anasarca etc.
 - (iv) Partially dilated cervix.

Most of the unsatisfactory results of fetotomy are attributed to the operator's lack of experience, to poorly designed instruments, to improper fetotomy technique, and to the use of fetotomy only as a last resort.

PERFECTION in fetotomy depends upon FOUR factors:

1. Technical knowledge.
2. Adequate training and experience.

3. Correctly designed instruments.
4. Proper lubrication, which is often the key to success.

The advantages of a correctly performed fetotomy are:

1. It reduces the size of the fetus to facilitate Safe delivery per-vaginum.
2. It avoids a caesarean operation hence exposure of the dam to surgical risk is avoided.
3. It requires little assistance, one or two persons is sufficient.
4. It will prevent possible trauma or injury to the dam through the use of excessive forced traction.
5. The general condition of dam tends to remain more stable than after caesarean section.
6. Recovery time is shorter and less after care is generally required.
7. The monetary return is equal to that from caesarean section in the field.

The common disadvantages / Hazards of fetotomy are:

1. It may be dangerous to dam causing injuries or lacerations to the uterus or birth canal by instruments or sharp edges of fetal bone.
2. It may take a longtime (than caesarean), exhausting both the dam and the operator and is conducive to trauma and pressure necrosis of the birth canal.
3. The veterinarian is subjected to the risk of wounds from instruments or sharp edges of bone fragments.
4. If the fetus is emphysematous there is a possibility of infection of the operator's hands.

In mare fetotomy or forced extraction are methods of choice for relieving the dystocia, because caesarean section is more difficult to perform successfully than in the other domestic animals. Fetotomies are not performed in the sow, bitch and cat because of lack of space and the caesarean section is much easier and safer in these small animals.

Fetotomy is performed in any normal or abnormal presentation, position and posture of the fetus. In many cases it is employed in relieving dystocia due to fetal monsters. Fetotomy operation should be planned and carried out carefully, so that there will be no wasted efforts. A light epidural anaesthesia prior to fetotomy prevents continual straining and sudden movements resulting from pain and allows the animal to remain standing.

(B) FETOTOMY OPERATIONS IN ANTERIOR PRESENTATION:

1. DECAPITATION OR AMPUTATION OF THE PROTRUDING HEAD:

Indications: It is indicated when one or both forelimbs are retained and the head has passed through the vulva and become swollen, emphysematous, or edematous so that it cannot be repelled. In such case fetus is usually dead.

Procedure: Fix the snare on the lower jaw of the fetus and exert traction in any direction desired by operator. Give transverse incision behind the jaw through the skin, muscles, pharynx, larynx, and oesophagus up to cervical vertebrae. After separating the skin over the head, the head is grasped and twisted rupturing the articular ligaments. Then the flap of the skin is secured by obstetrical chain or snare, which pulls the skin over exposed cervical vertebrae. The fetus is then repelled and the abnormal posture of limbs is corrected by mutation. Then traction on the neck and two front legs result in relief of dystocia.

The fetotome could also be used in this operation especially when the head is engaged in the pelvic cavity, but the technique just described saves time as well as after care. While using fetotome the head of fetotome is placed at the throat region of the extended fetal head and then wire sawing will cut open the head just behind the ears and horn but at the occipito-atlantal joint.

2. CEPHALOTOMY OR CRANIOTOMY:

Indications: It is indicated only rarely when fetal hydrocephalus or other cranial deformities are the cause of dystocia.

Procedure: Fix the head of the fetus with a snare around the lower jaw. Pass fetotome wire around the base of distended cranium and separate the enlarged cranium from the rest of the head. Then the collapsed cranium bones and skin are removed and rest of the fetus can be with drawn by traction. In case of hydrocephalus, sometimes simply incising the distended cranium causes a sufficient reduction in the size to permit delivery.

3. AMPUTATION OF THE HEAD AND NECK:

Indications: (i) when the head & neck are retained beneath, alongside or above the body of the fetus (ii) in case of dry emphysematous fetus (iii) In case of juvenile or hypoplastic pelvis or a large fetal head.

Procedure: Operation is performed either by wire saw or fetotome. The head of the fetotome is held forcibly between shoulder joint and neck of the fetus after placing the threaded fetotome wire over the base of flexed neck and the neck of the fetus is separated as close to the body of the fetus as possible.

The neck and head are then withdrawn by means of the hand and a snare of Krey Schottler's Obstetrical Hooks by applying simple traction. After that the traction on the forelegs of the fetus will deliver the rest of the fetal body. If the cervical stump is long it must be guided and guarded with the hand or Krey Schottler's Obstetrical Hooks to prevent lacerations of the birth canal, as fetus is withdrawn.

4. AMPUTATION OF THE FORELIMB (S):

Indications: (i) To provide space for other fetotomy operations, (ii) if the forelimbs are retained or extended beneath the fetal body and mutation is not possible due to emphysema of the fetus or due to contraction of the uterine horn, amputation of the forelimbs is necessary, (iii) in case of ventral transverse presentation of the fetus in the mare, and (iv) incase of large or emphysematous fetuses to reduce their size and to expose the ribs for evisceration.

Procedure: After applying constant traction to the leg with the snare, a crescent shape incision is made through the skin, trapezius and rhomboidus muscles of the fetus dorsal to the scapula with a knife to separate the dorsal end of scapula from the body. A loop of fetotome's wire is placed around the limb and moved up the limb as the head of fetotome is placed in pectoral region. The wire loop is then moved upward and placed in the incision under the cartilage of the scapula and the limb is separated or removed by to & fro movement of the wire. Removal of limb is easy in cows but more difficult in mare due to longer legs in equine fetus. Another method is that of placing the loop of fetotome wire around the limb to be removed while the head of fetotome is placed just dorsal and caudal to the top of fetal scapula.

In both above methods of amputation of forelimbs, the skin over the chest wall is removed, so that the broken ends of the ribs are not protected if evisceration is to be performed. Therefore, subcutaneous amputation of the forelimb is preferred when evisceration in emphysematous fetus is required as it preserves the skin flaps to protect the broken ends of the ribs.

5. SUBCUTANEOUS AMPUTATION OF THE FORELIMB (S):

Indications: Same as above but is meant for preservation of skin over chest wall when evisceration operation is to be performed.

Procedure: Apply constant or steady traction to the limb by snare or obstetrical chain around the fetlock. Make the incision by placing the knife at the top of the leg to the pastern joint. Then the skin is separated from the entire length of the leg starting from the fetlock joint by thumb and fingers. The skin is separated at fetlock joint by cutting fetlock joint so that the pastern joint and hoof remains attached to the skin. Then the strong traction is applied to the leg by placing snare around metacarpal bone. The pectoral muscles, nerves and the vessels under the scapula are broken with finger or knife. Thus the bony leg is removed by traction keeping the skin flap attached to the body to provide covering after evisceration by breaking the chest wall.

(6) EVISCERATION IN ANTERIOR PRESENTATION:

Indication: (1) In fetal ascites to release fluid (ii) In large or emphysematous fetus to reduce the size, and (iii) to provide place for threading the wire for hip lock condition in anterior presentation.

Procedure: First of all amputation of forelimb by subcutaneous method is performed, exposing the ribs. Then the intercostals muscles between first to fifth ribs are separated by the finger or knife from the spine to the sternum. In order to gain free access to the thoracic and abdominal cavities, the 2nd, 3rd and sometimes 4th ribs are removed by cutting the costal cartilage just above the sternum with a knife, cutis separator, or cutting hook and bending the ribs dorsally to break it off next to, the spinal column. The ribs should not be broken in the middle as it is difficult to remove both ends, and the broken ends are likely to cause injury to the operator's hand and dam. Then the heart and lungs are removed by manual traction after grasping the heart at its base and lungs in the region of the bifurcation of trachea one by one or both lung can be removed, the fingers are thrust through the diaphragm in the region of the large vessels and the opening is enlarged. The stomach and intestines are easily removed by wrapping them around the hand. The liver is pulled loose from the diaphragm and withdrawn usually in several pieces. The kidneys are small and therefore need not be removed. Remaining fetus is then delivered by traction after covering the exposed sharp ends of the broken ribs by the skin flap.

7. DETRUNKATION IN ANTERIOR PRESENTATION:

Indications: (i) When the fetus is in a "Dog sitting" posture with the hind limbs extended along side or beneath the body and wedged into the maternal pelvis (ii) When the head and forelegs are outside the vulva and repulsion or mutation is impossible due to protracted dystocia.

Procedure: A loop of fetotome wire is passed around the body of the fetus and the head of the fetotome is inserted into the birth canal over the lumbar region of the fetus. After the wire is manipulated back of the last ribs, detruncating is rapidly performed. Evisceration makes this operation safer and easier, if fetus is enlarged, emphysematous or swollen in dry birth canal.

Lubrication to prevent trauma to the birth canal is essential. Following detruncating and removing head and thorax, chains are applied to the two hind limbs and by traction on the limbs and repulsion of the spines; the hindquarters of the fetus are turned to posterior presentation and dorso- pubic position. After the hindquarters have been rotated to a dorso-

sacral position they are removed by traction. If the pelvis of the fetus is large, its bisection should be considered.

8. BISECTION OF THE PELVIS IN ANTERIOR PRESENTATION:

Indications: When fetal pelvis becomes wedged in the maternal pelvis causing "Hip lock" condition due to narrow bisiliac diameter than the distance between greater trochanters of the fetal hip. This may cause obturator paralysis and to prevent further trauma to this nerve, it is indicated to bisect pelvis.

Procedure: Bisection of the pelvis is performed with the help of fetotome. The wire is passed over the top of the fetal pelvis and as far down as possible behind the ischial arch. By passing the hand under the fetus and fetal pelvis the wire is pulled between the hind legs. After placing this end of wire through fetotome, the head of the fetotome is placed alongside the body of the fetus opposite the ribs. If the loop of the wire is on the right side of the tail, the head of fetotome should be on the left side of the fetus so the fetotome wire passes through the middle of the pelvis and not through the head of the femur. After the pelvis is bisected the fetus minus one hind leg can be removed. Then the operator grasps the exposed pelvic bones, the other hind leg can be with drawn. This operation is made easier by evisceration, which allows the operator more room in the pelvic cavity for placing the wire and the fetotome in position.

(C) FETOTOMY OPERATIONS IN THE POSTERIOR PRESENTATION:

Fetotomy in normal posterior presentation is indicated when the diameter of the fetal pelvis is relatively larger than the diameter of the pelvic inlet and wedging or hip-lock condition occurs. This condition is seen usually in immature or stunted heifers and may be complicated by an emphysematous fetus hence caesarean section or slaughter may occasionally be advisable.

1. AMPUTATION OF THE HIND LIMB:

Indication: It is indicated in " Hip lock Condition" of the fetus.

Procedure: A transverse incision just cranial to the external wing of the ilium is made through skin and muscles. A loop of the fetotome wire is then carried up to the hind leg and placed in this incision. The head of the fetotome is placed between the hind legs and by sawing movement of the wire one hind leg and portion of the pelvis is amputated and removed safely. Then the rest of the fetus can be delivered easily in the posterior presentation. In another technique the wire is fixed around the leg to be amputated with incision and placing the fetotome head at the dorsum of the wings of ilium or even on the lumbar region and amputation is carried out.

2. BISECTION OF PELVIS IN POSTERIOR PRESENTATION:

Indication: "Breech presentation" where in the hind limbs of the fetus are extended beneath the body of the fetus, the uterus is contracted and the fetus becomes emphysematous or swollen, birth canal is usually dry and edematous or swollen. In such conditions mutation is not possible, or is difficult.

Procedure: The heavy Sand's pattern rope carrier is tied to the fetotome wire and through birth canal over the thigh of fetus, between the leg and abdomen. It is pushed as far ahead as possible ventrally and caudally. Then the hand is passed beneath the fetal pelvis and between the legs and the wire is drawn out through vulva. The head of the fetotome is placed on the hip opposite the leg to be removed and is held in place tightly or firmly. After the leg and a portion of pelvis is amputated and removed, the rest of the fetus can usually be withdrawn by traction on pelvic bone by applying Krey's Schottler's obstetrical hook.

3. EVISCERATION IN POSTERIOR PRESENTATION:

Indication: To reduce the size of the fetus in order to effect the removal of the fetus.

Procedure: After removal of one or both the posterior limbs, the opening into the abdominal cavity may be enlarged and abdominal viscera are raised as described under evisceration in the anterior presentation but in a reverse manner. After removing the abdominal viscera the thoracic organs are removed. Using the blunt cutting hook as described in anterior presentation but in the reverse order may break down the ribs.

4. DETRUNKATION OR TRANSECTION OF THE FOETAL TRUNK:

It is indicated when the fetus is large and wedged in the birth canal may be due to much swollen part of the fetal body. The operation is performed as described in anterior presentation by threading and placing the wire at the desired site lumbar, thoracic or scapular region of amputation and fixing the fetotome head firmly on the dorsum of the fetus in such a way that the fetotome wire cuts the body in exactly transverse direction at the appropriate point desired. Then the fetus is withdrawn easily or in some of amputation of foreleg in oblique longitudinal direction may be required if the fetal thorax is much larger.

(D) FETOTOMIES IN TRANSVERSE PRESENTATIONS AND FETAL MONSTROSITIES AND MALPOSTURES:

Most of the fetotomy procedures in such situations are the same or just modification of the procedures just described in previous chapters. In many complexities like fetal monstrosities a complete fetotomy may be required to effect safe and easy delivery of the monsters. Obstetrical procedures in some of such situations have been described here for extraction of the fetus.

1. FETOTOMIES IN DORO- TRANSVERSE PRESENTATION:

In this irregularity, which is fortunately uncommon both in the cow and the mare and is much rarer than the ventro-transverse presentation, the fetus lies with its back situated transversely, in a nearly horizontal plane, in front of the pelvic inlet, one end of the body being directed to the right, the other to the left. In such a situation diagnosis is sometimes difficult as to which side the fore part of the body and the head lies. The fetotomy operation is only indicated when mutation operation fails to correct the presentation prior to forced extraction. In this successful fetotomy is also one of the most tedious jobs to perform especially in passing the snare introducer carrying wire saw, for division of trunk, around the foetus. In any case, division of the dorsal vertebrae after evisceration of the abdominal cavity must be attempted first, which favours complete division of the fetus. Ensuring the corresponding extremities, after the division of the fetal trunk, effects removal of the anterior and posterior parts of the body. In case of pronounced oblique presentation, amputation of the femur or humerus within reach of the hand, amputations of the dorsally situated limb (separation at the shoulder blade or at the hip joint) considerably facilitate further operative procedures.

2. VENTRO- TRANSVERSE PRESENTATION AND FETOTOMY:

The ventro-transverse presentation is more frequent than dorso- transverse; and it is more common in the mare than in the cow. In most cases the presentation is oblique with fore part of the fetal body lies nearer the pelvic inlet than the hind part, or the converse. The fetal body is approximately in the horizontal plane with its abdominal surface directed towards the pelvis, usually with both pairs of limbs in the vagina. The head may lie laterally with the face turned more or less towards the maternal pelvis and within easy reach of the hand or more frequently it is displaced backwards and out of reach.

The diagnosis of ventro- transverse presentation is not much difficult but it must be first determined that the four limbs lying in the vagina belong to one foetus, and that it is not a case of twin pregnancy with the simultaneous entry of the fore parts of one foetus and the hind parts of another. Also Schistosomus reflexus, a monster common in the cow and rare in mare is easy to differentiate from this.

First of all, either the fore limbs are separated from the thorax by percutaneous or subcutaneous amputation; if mutation is not possible directly then only the delivery of a foetus impacted in ventro-transverse presentation can be effected by rotation. Amputation at the elbow or shoulder joint may be sufficient, in the mare, and should be performed with knife or wire saw. Total or partial amputation of the hind limbs is only to be undertaken with a definite sole reason. After amputation of the fetal extremities lodging the fetus into the pelvis, the rest of the fetus can be rotated by mutation and the delivery is effected/safely.

3. FETAL MONSTROSITIES AND FETOTOMY:

Fetal monstrosities occur in such a wide variety of types and presentations that description of specific procedures for all types is impossible. Some general recommendations and / or suggestions are offered for the most commonly encountered fetal monstrosities.

(A) SCHISTOSOMUS REFLEXUS: The principal defect in this is characterized by an acute ventrolateral curvature of the fetal spine, which permits the head to rest or near the sacrum. The abdominal walls, and sometimes the thoracic walls, are reflected laterally and dorsally, exposing the viscera. The fetus may be presented viscerally, exposing the viscera, or by its extremities.

(a) In **VISCERAL PRESENTATION** the viscera should first be removed manually, to identify the rigid: quite acute, vertebral angulations at the pelvic inlet. The primary objective of fetotomy is bisection of the fetal trunk at the point of spinal angulation, which is performed by fetotome threaded with wire saw, around the fetal trunk at or near the point of angulation and passing the head of fetotome against the fetal spins in close proximity to the point of spinal angulation. After the fetal trunk has been divided, the two portions may be removed by aid of the Krey Schottler's hook after covering the sharp bony prominence.

(b) When the **EXTREMITIES** are presented (three or four legs within the pelvic inlet) the approach usually recommended is individual amputation of the limbs, followed by amputation of the head. The fetal trunk is then divided at or near the acute angulation.

Another more expedient approach successfully applied in the Netherlands, is as follow. A snare or chain is affixed to one of two of the limbs to aid in better positioning of the fetus. The fetotome is fully threaded. With the loop of saw wire held exteriorly, the fetotome is introduced and passed cranially until it rests on the mid portion of the fetal trunk. Then under controlled tension, the loop of wire is introduced and guided carefully so that it surrounds all the limbs and as the loop is directed further forward, it encompasses the head and pelvic region. Then by properly & firmly held fetotome in position, the fetal body is divided. The amputated portion then includes the head, neck and forelimbs, and part of pelvis & hind limbs-all of the extremities being held together by skin and some muscle tissue, which often as a whole extracted by some manipulation. The remaining fetal trunk can be removed without further reduction in dimension. When the trunk cannot be safely extracted, it can be divided at or near the point of spinal angulation, using the procedure described under visceral presentation.

(B) PEROSOMUS ELUMBIS: In this condition, the vertebrae and spinal cord of the fetus are missing from the thoracic region to the tail. The pelvis is deformed, small and flattened, and the hind limbs are strongly ankylosed and flexed. The fetus is usually small so that the forepart negotiates the birth canal quite easily; however, the ankylosed distorted rear limbs

cannot enter the pelvic inlet. Forced traction is contraindicated because of strongly ankylosed & flexed stifle joints, which may cause uterine rupture. The recommended fetotomy procedure is transverse division of the fetal trunk, followed by longitudinal division of the fetal pelvis as described under fetotomy in posterior presentation.

(C) HYDROCEPHALUS AND FETAL ANASARCA:

Fetotomy operations in both these conditions have been described under fetotomy in the anterior presentation using technique of amputation of forelimb or/and cephalotomy or craniotomy for hydrocephalus and several longitudinal skin incisions on lateral surface of the fetal body by knife to reduce the size of fetal anasarca or even amputation of one limb along with above said incision effects delivery of the anasarca fetus.