

ULTRASONOGRAPHIC DIAGNOSIS AND SURGICAL MANAGEMENT OF SOME SWELLINGS AROUND THE UDDER IN CATTLE, SHEEP AND GOATS

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ABSTRACT

Fifteen cases (seven goats, six cows and two ewes) with different swellings around the udder were recorded in this study. Premammary seroma, supramammary hematoma, ventral hernias, ventral gravid metrocele, udder abscesses and pendulous udders were all recorded. The clinical symptoms as well as the ultrasonographic pictures of these swellings were described and illustrated. Surgical interference was performed and results were interpreted and discussed. The ultrasonogram of the supramammary hematoma showed anechoic appearance with heterogeneous hypoechoic contents in some areas and a surrounding echogenic wall. The ultrasonogram of the premammary seroma showed clear anechoic cavity associated with a movable hyperechoic thick membrane at the ventral aspect of the swelling. The dimensions of the ventral hernial rings as well as the natures and characters of the hernial contents were successfully evaluated by using ultrasonography. The results of this study demonstrated that ultrasonography might be of high importance as an additional and supporting technique for the diagnosis of swellings at the level of the udder.

INTRODUCTION

Swellings at the level of the mammary gland are of clinical significance and should be diagnosed early and corrected to avoid its extension to and/or damage of the udder parenchyma. Pathological and surgical conditions of the mammary gland in food animals may greatly affect milk production (**Hofmeyr, 1990, Rebhun et al, 1995**).

Diagnostic ultrasonography is a technique which has much to offer in veterinary medicine and surgery. Real time ultrasonography has gained tremendous popularity in the recent years as a diagnostic tool. Ultrasonography has been used for evaluation of some pathological conditions of the mammary gland in food animals (**Cartee et al, 1986; Bradley et al 2001 and Franz et al, 2001**). It proved to be a valuable system for visualizing changes of the mammary gland

(Bruckmaier and Blum, 1992); however, many other conditions at the level of the udder still need to be interpreted ultrasonography.

Udder hematomas are not uncommon in cattle, however, hematomas at the caudal aspect of the mammary gland seem unusual (Bleul, 1997). Udder hematomas are most likely preamammary due to rupture of the large subcutaneous tortuous abdominal veins (Hofmeyr, 1990). Udder hematomas may be extremely dangerous since blood tends to accumulate subcutaneously, allowing massive blood loss. Cattle with udder hematomas that progressively enlarge may die over few days (Rebhun et al, 1995).

Seroma of the mammary gland is unusual in cows (Rebhun et al, 1995). A similar condition, subfacial cyst, has been described in cows, however, perusal of literatures and databases revealed only one case report in a Holstein Friesian cow (Andersen and Surborg, 1979).

Ventral abdominal hernia at the level of the udder usually leads to suspended udder which is subjected to different traumas by foreign objects on the ground or by stumbling (Misk et al, 1986). Occasionally, displacement of the gravid uterus in ruminants may occur through rupture of the ventral abdominal floor (Radhakrishnan et al, 1993). Ventral metrocele (gravid) may be associated with dystocia and should be closely observed during labor (Arthur, 1989).

The purpose of this study was to present the ultrasonographic picture and the surgical intervention and outcome of some unusual swellings at the level of the udder in cattle, sheep and goats. Interpretation of diagnostic ultrasonography together with surgical exploration had been conducted to achieve meaningful correlation. Moreover, some other common swellings at the level of the udder were also illustrated ultrasonically, treated surgically and discussed.

MATERIAL AND METHODS

Fifteen cases (seven goats, six cows and two ewes) with different swellings at the level of the udder were recorded in this study. The case history and clinical examination for each case was performed. The animals were sedated by using Rompun (2% Xylazine HCL solution, Bayer agricultural Division, Shawnee Mission, KS) at a dose rate of 0.05 mg/kg b.wt. (for cattle and goats) or 0.2 mg/kg b.wt. (for sheep) intramuscularly. Ultrasonographical examination (B-mode) was performed by using high frequency transducer (7.5, 8 and/or 10 MHz) and real time scanner (Pie-Medical Scanner, Model 200-V, Holland). A sterile coupling gel was applied over the examined swelling. Each swelling was examined in horizontal and vertical planes. The diagnoses were proven by needle aspiration or during surgery in some cases. Specimens from some swellings were fixed in 10% formalin solution. Five micron thick paraffin sections were prepared, stained

with hematoxylin & eosin and examined microscopically. Most of these cases were corrected on the classical surgical principles under the effect of linear infiltration analgesia using 2% lignocaine HCL at the site of the operation. Follow up of these cases was carried out for a period ranged between one to three months.

RESULTS

Premammary seroma in a cow:

A 4 -year-old Friesian cow was admitted to the clinic with a large circumscribed swelling at the level of the udder (Fig 1, a). Clinical examination revealed a soft, fluctuating and painless swelling just in front of the right fore quarter of the mammary gland. Ultrasonographic examination revealed the presence of anechoic fluid filling the cavity of this swelling (Fig 1, b). A movable hyperechoic thick membrane could be identified at the ventral aspect of this swelling. Exploratory puncture revealed odorless serous fluid (Fig1, c). The case was diagnosed as a seroma. The area was prepared for aseptic surgery. Under the effect of local infiltration analgesia, a 10 cm surgical incision was performed and the swelling was evacuated. Exploration of the swelling's cavity revealed a 16-cm in length grayish white sheet (Fig 1, d). There was no communication between the swelling's cavity and the mammary gland. The cavity was evacuated and the incision was partially sutured after application of a drain (Fig 1, e). Histopathological examination of the sheet revealed that it made of fibrinous material without any evidence of neoplastic cellular component. Recovery was uneventful.

Supramammary hematoma in a cow:

A 5-year-old cow was presented with an unusual large diffuse swelling of three weeks duration at the level of the udder. The mass seemed as large as the size of the mammary gland itself. It was located at the caudo-dorsal aspect of the mammary gland (Fig 2 a&b). Digital palpation revealed a soft, fluctuating painless swelling with intact skin. Ultrasonographic examination revealed anechoic appearance with heterogeneous hypoechoic contents and a surrounding echogenic wall (Fig 2, c). Exploratory puncture yielded a serosanguineous fluid. The case was diagnosed as a large supramammary hematoma. The hematoma was opened under complete aseptic precautions. The swelling was carefully evacuated from large quantity of the serosanguineous fluid and clotted blood and drained (Fig 2, d). Postoperative care was mostly hot water fomentation several times daily. Recovery was uneventful.

Irreducible ventral metrocele (gravid) in a goat:

A 3-year-old pluriparous goat, about four months pregnant, was presented to the clinic with a history of gradual increasing swelling at the level of the udder (Fig 3, a & b). Clinical examination revealed the presence of irreducible hernia occupying the caudodorsal area of the mammary gland. Palpation of the hernial content revealed the presence of fetal parts and the characteristic skeleton of the fetus was identified. Ultrasonographical examination confirmed the presence of two alive foeti with marked hyperechoic images which represented the bony skeletons (Fig 3, c). The case was diagnosed as a metrocele (gravid) and it was decided to perform cesarean section and herniorrhaphy.

An oblique skin incision, 15 cm in length was performed in the left side at the caudodorsal aspect of the mammary gland (Fig 3, d). The subcutaneous tissue was dissected and the peritoneum was incised. The uterus was partially exteriorized through the incision. A fetal limb within the uterus was drawn to the incision site the uterus was incised over the limb and the fetus was delivered. Examination of the contralateral uterine horn revealed the presence of the other fetus which also delivered through the same incision. The fetal membranes were trimmed and replaced in the uterus. The two fetoi were delivered alive. The uterine wall was sutured with a double layer of inverting sutures (Schmedien and lembert suture patterns) using No 1 chromic catgut. The uterus was replaced through the hernial ring to its normal position in the abdominal cavity. A therapeutic dose of oxytertracycline in half liter of sterile saline was administered as intraperitoneal medication after replacement of the uterus. The hernial ring was trimmed and sutured with horizontal Mattress suture pattern using chromic cat gut No.2 The subcutaneous tissue was closed in a simple continuous pattern with catgut No 1. Skin was closed with an interlocking pattern using synthetic non absorbable suture material. Both of the dam and the two kids made uneventful recovery for one month postoperatively.

Reducible ventral abdominal hernia in goats:

Two goats (2 and 3 years old) were presented to the clinic with a history of a swelling at the level of the udder since a period ranged from a month to three months (Fig 4). Palpation revealed a reducible soft doughy mass and a firm hernial ring at the muscles of the ventral abdominal wall beside the level of the external inguinal ring. Ultrasonograms revealed a hyperechoic linear hernial ring and the presence of the echogenic intestine subcutaneously. Bowel thickness and motility were clearly identified. The anechoic spaces between the loops of the bowel revealed the status of the peritoneal fluids. The dimensions of the hernial rings were about (8 cm X 4 cm) and (5cm x 3cm) in the examined two cases. These cases were diagnosed as reducible ventral abdom-

inal hernias at the level of the udder. During surgery, the hernial content was reduced easily through an aperture beside the level of the external inguinal ring in both cases. A severed lateral suspensory ligament of the udder was detected. The hernial ring was closed with inverted mattress sutures using chromic catgut and the operation was completed as usual. Recovery was uneventful in both cases.

Abscesses at the level of the mammary gland and Pendulous udder

Different varieties of abscesses at the level of the mammary glands were recorded and evaluated sonographically in five animals (3 cows, one goat and one ewe). Most of these cases (4 cases) were subcutaneous abscess, while abscess of the supramammary lymph node was illustrated in only one cow. Clinically, abscesses of the mammary gland were circumscribed, hot and painful. Ultrasonograms of abscesses at the level of the udder revealed well circumscribed masses with irregular, multiple, hypoechogenic areas, corresponding to fluids and necrotic tissues. A thick hyperechoic wall was detected outlining the swelling.

Pendulous udder was examined ultrasonography in five animals (3 goats, one cow and one ewe). Ultrasonograms of the affected cases revealed the marked interruption in the continuity of abdominal wall. The intact wall appeared as several echoic and anechoic layers, while the interrupted area appeared totally anechoic. The ruptured medial suspensory ligament as well as the degree and extend of the rupture could be identified. Ultrasonically, the viscera had been illustrated subcutaneously (Fig 5). All of the animals with pendulous udder seemed inoperable and no attempts were carried out for their corrections.

DISCUSSION

Many surgical and pathological swellings around the mammary glands demand correct diagnosis and surgical intervention. Ultrasonography proved to have a great impact on the differential diagnosis of such swellings and is a very useful diagnostic tool. Ventral hernias, abscesses, hematoma and seroma at the level of the mammary gland were efficiently illustrated and differentiated ultrasonographically.

The most common site of udder hematomas is premammamary rather than postmammary (Hofmeyr, 1990). The massive hematoma cranial to the udder (premammary hematoma) results from rupture of the large tortuous abdominal veins which located subcutaneously and subjected to injury by blunt trauma (Hofmeyr, 1990). Hematoma caudal to the udder seems unusual. The question of whether to treat the hematoma conservatively or surgically is controversial (Davies,

1968; Giles, 1968 and Bleul, 1997). Generally, the decision of surgery is made on the size of the hematoma and the length of the time elapsed between the accident and treatment. The size of the hematoma depend on type and size of the bleeding vessels, blood pressure, blood coagulation, stretching capacity of tissue in the lesion, and functional status of the body (Plakhotin, 1984). The ultrasonographic picture of mammary gland hematoma was mainly anechoic with heterogeneous hypoechoic contents and a surrounding echogenic wall. This result is consistent with that reported for penile, uterine broad ligament and perivascular jugular hematomas in cattle which evaluated ultrasonographically by some investigators (Cockcroft, 1999; Pusterla and Braun, 1995 and Andersen et al, 1996). However, hematoma may show a variable ultrasonographic pattern depending on the duration, and the stages of clotting and organization.

Rarely, massive hematomas in the region of the bovine udder may be mistaken for rupture of the prepubic tendon (Roberts, 1971). The prepubic tendon of the ruminants is composed of the crossed and uncrossed tendons of origin of the pectineus muscles, the pelvic tendons of the rectus and obliques abdominis muscles, and the tendons of origin of the cranial parts of the gracilis muscles (Habel and Budras, 1992). Ultrasound may be used successfully for differentiation between mammary gland hematoma and ruptured prepubic tendon.

Collectively, ventral hernias have a considerable frequency among the surgical affections of the abdominal wall in farm animals. It occurs with higher percentage in females than in males and this seemed to be contributed to the factor of pregnancy (Tirgari, 1980, Youssef, 1984). In this study, the ventral hernia at the level of the udder was mostly recorded in goats. The abdominal wall of the goat is relatively thin; muscle tearing and separation often occur from blunt trauma during shearing, fighting, or crowding through narrow doorways (Smith and Sherman, 1994). Occasionally trauma or extremely abdominal distention leads to rupture of the ventral abdominal muscles caudal to the umbilicus. This might results in edematous swelling of the abdominal wall and dropping of the udder (Smith and Sherman, 1994). The late pregnant uterus can become trapped in the hernia in a subcutaneous location making vaginal delivery difficult (Horenstein and Elias, 1987). Ventral hernias at the level of the udder with or without entrapment of the pregnant uterus were recorded in this study.

Ultrasonogram of the hernial contents clearly determined its content. Bowel thickness and motility were identified by using the echogenic gaseous fluid filled lumen as a relatively dynamic landmark. In these cases, absence of ascites or peritonitis was also confirmed by ultrasonography. The presence or absence of the peritoneal fluid as well as its volume can be clearly identified. Moreover, in advanced cases of peritonitis, fibrin can be observed floating free or adhering to roughened or etched peritoneal surfaces (Rantanen, 1986; Nyland and Mattoon, 1995). Ultrasonogram of metrocele clearly identified the presence, site, numbers and status of the fetus.

In this study, the surgical repair of most of the ventral hernias at the level of the udder was successful. This result coincides with that reported in a goat by **Misk et al (1986)**. Although the ventral metrocele (gravid) showed a successful repair for a one month postoperatively, its recurrence may occur on the long run due to the large size of the hernial ring.

The indications for caesarean section in the ewe fall into two main categories either for treatment of existing dystocia when successful vaginal delivery is impossible and very risky or as an elective caesarean section (**Thorne and Jackson, 2000**). Ring womb, oversized fetus, emphysematous fetus and small pelvic passageway are the main causes of dystocia in ewes (**Winter, 1999**). Ewes with severe pregnancy toxemia and those unlikely to lamb by the vaginal route (e.g., with an existing fractured pelvis) are candidates for elective caesarean section (**Thorne and Jackson, 2000**).

The traditional surgical approach for caesarean section in sheep and goats is via the left flank approach, however, paramedian, right flank, and midline approaches could also be used as alternatives. Nevertheless, the midline approach is not recommended in small ruminants by many practitioners as it requires general anesthesia (**Thorne and Jackson, 2000**). In this study, another surgical approach was employed. The cesarean section was performed at the left caudolateral aspect of the mammary gland. The application of this approach in these exceptional conditions seems essential.

The ultrasonographic picture of the abscesses revealed irregular, multiple, hypoechogenic areas surrounded by a thick hyperechoic wall. One of the major potential benefits of ultrasonographic examination of abscesses is the detection and localization of foreign bodies which cast the clear acoustic shadows (**Barr, 1990**). Although none of the cases with pendulous udder was corrected surgically, it has a characteristic ultrasonogram which facilitates its differentiation from other types of swellings at the level of the mammary gland. The normal abdominal wall in goats could be easily identified as several echoic and anechoic layers representing the skin, subcutaneous tissue, muscles and peritoneum. This finding is similar to those reported in other domestic animals (**Nyland and Mattoon, 1995**). However, marked interruption in the continuity of this hyperechoic line could easily be identified in cases with pendulous udder.

In conclusion ultrasonography was helpful in establishing a definitive diagnosis for the swellings at the level of the mammary gland. It is a very reliable and informative aid not only in the diagnosis but also in determining the choice of therapy for these types of swellings.

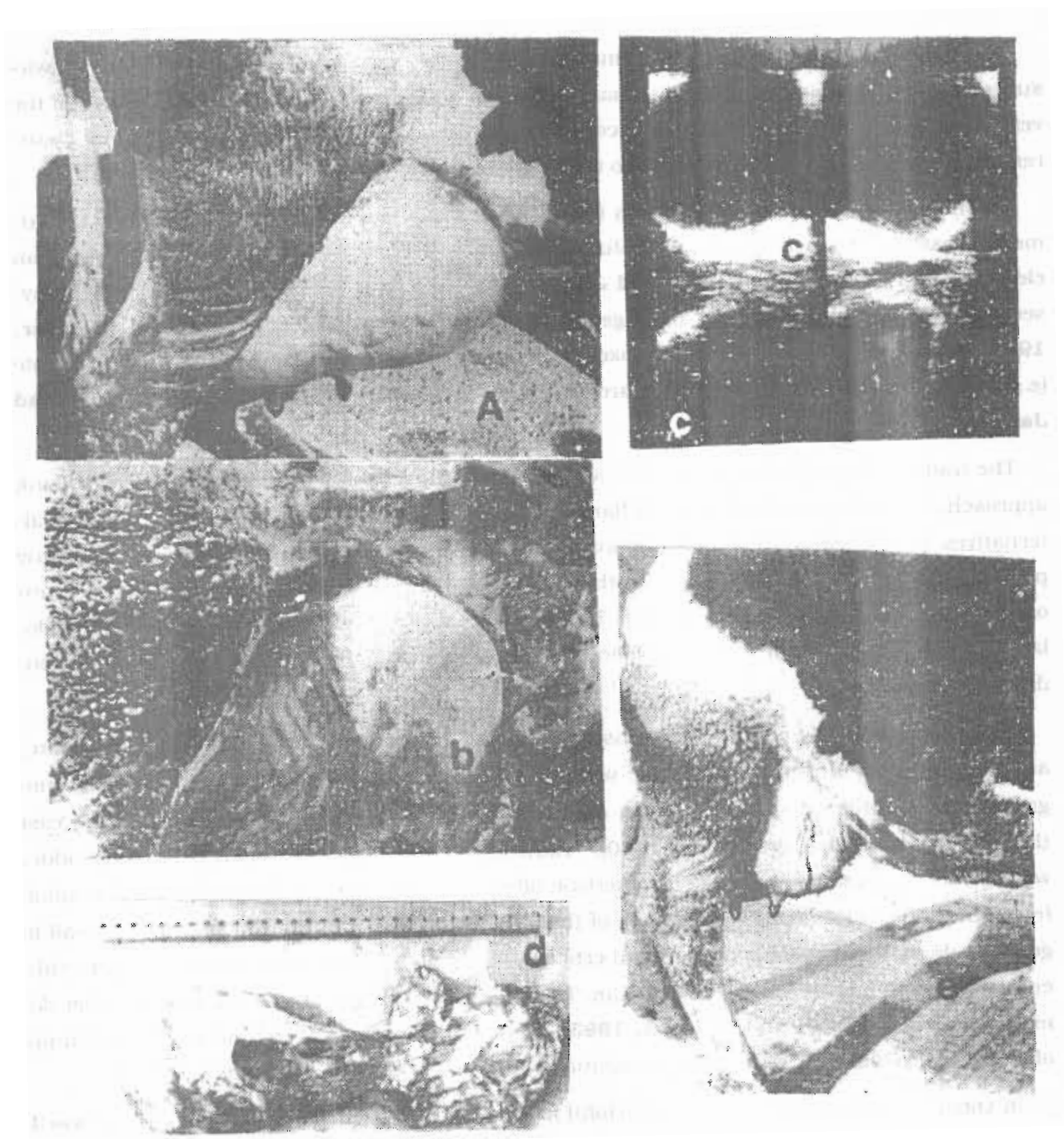


Fig 1 : A large circumscribed seroma in front the udder in a cow(a), horizontal and vertical ultrasonograms showing anechoic fluid filling the cavity of the swelling (b). Needle aspiration revealed a clear yellowish fluid (c). A grayish white long sheet exteriorized from the cavity (d). The same case postoperatively (e).

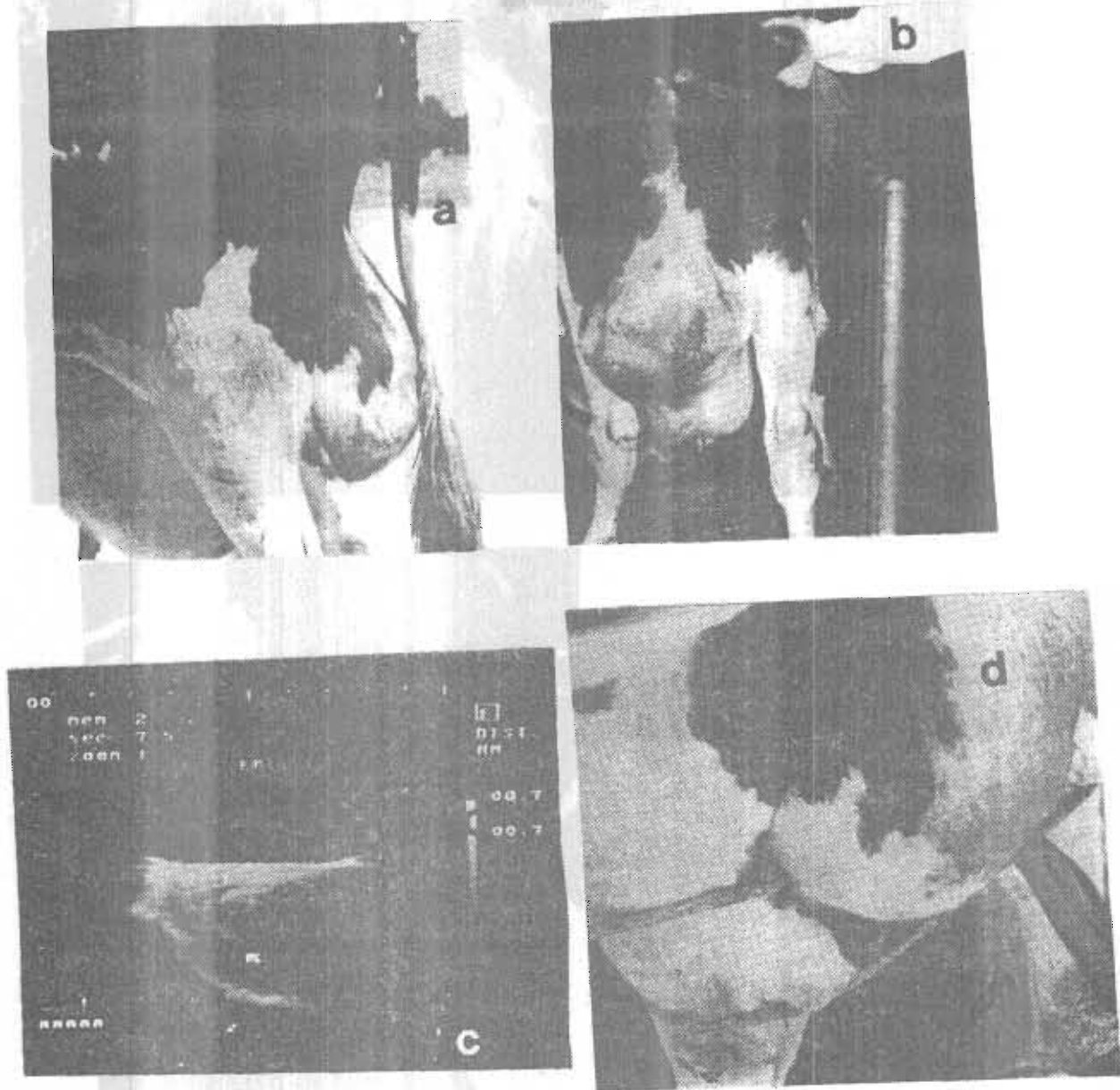


Fig. 2 : Lateral and caudal views of a large hematoma at the caudo-dorsal aspect of the mammary gland in a cow (a&b), Ultrasonogram revealed anechoic appearance with heterogeneous hypoechoic contents and a surrounding echogenic wall (c), incision of the swelling revealed a serosanguineous fluid (d).

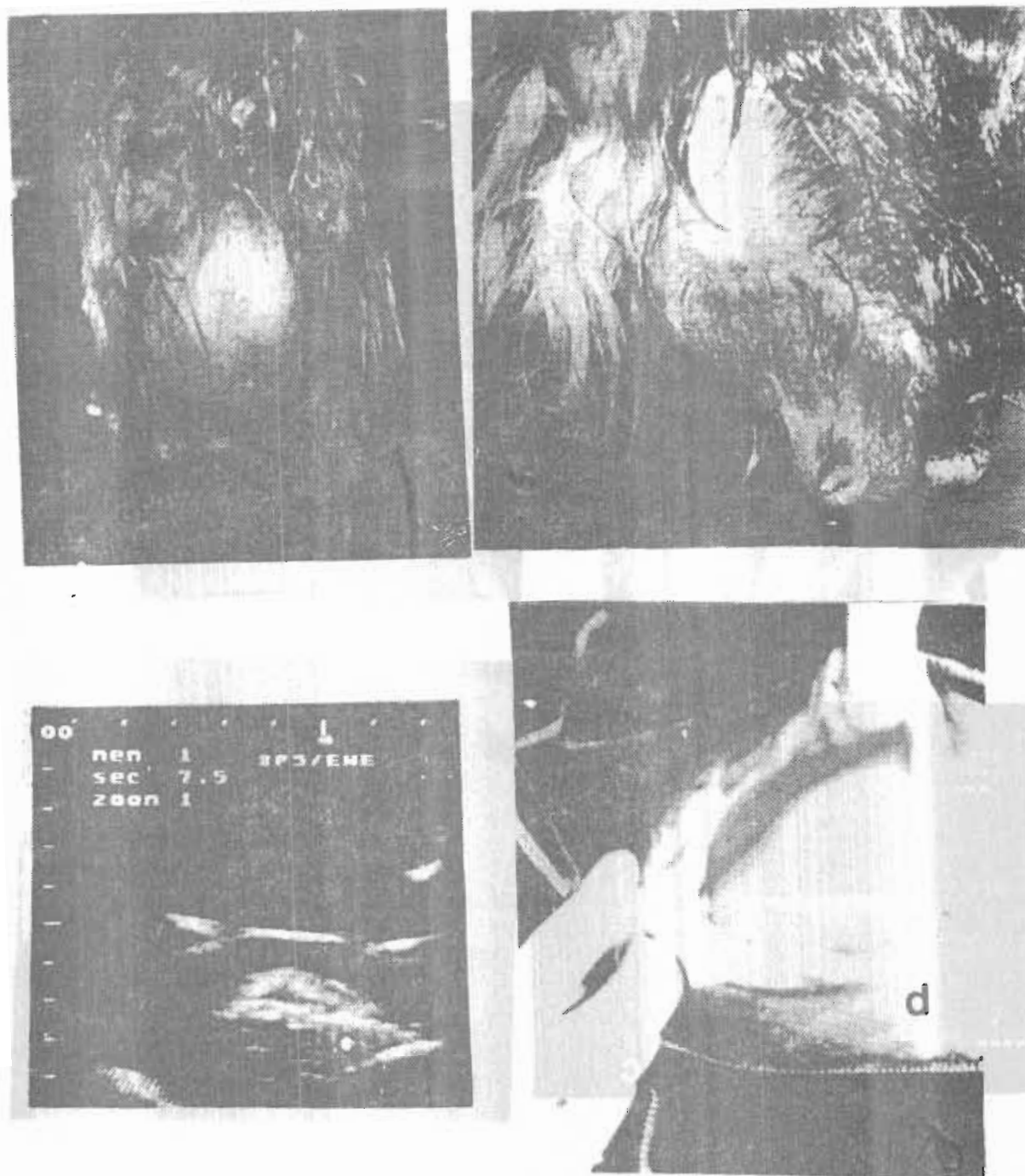


Fig 3 : Ventral metrocele (gravid) in a goat. A diffuse swelling at the caudodorsal aspect of the mammary gland (a&b), ultrasonogram of the metrocele showing hyperechoic image of the fetal skeleton (c), an oblique cutaneous incision on the dorsal aspect of the mammary gland (d).

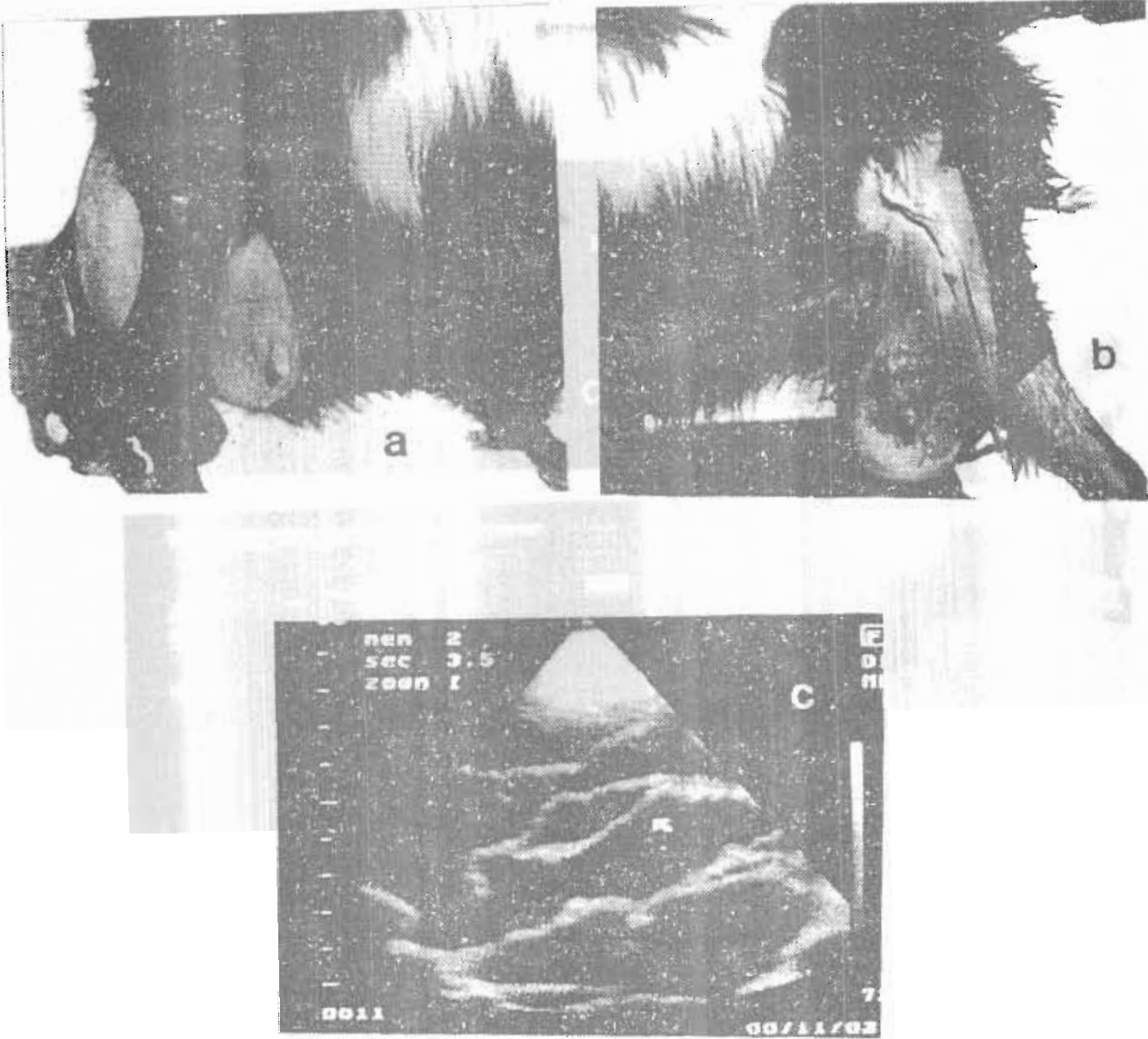


Fig 4 : Hernia at the level of the udder in a goat (a), the same animal postoperatively (b), ultrasonogram illustrating the echogenic bowel (c).

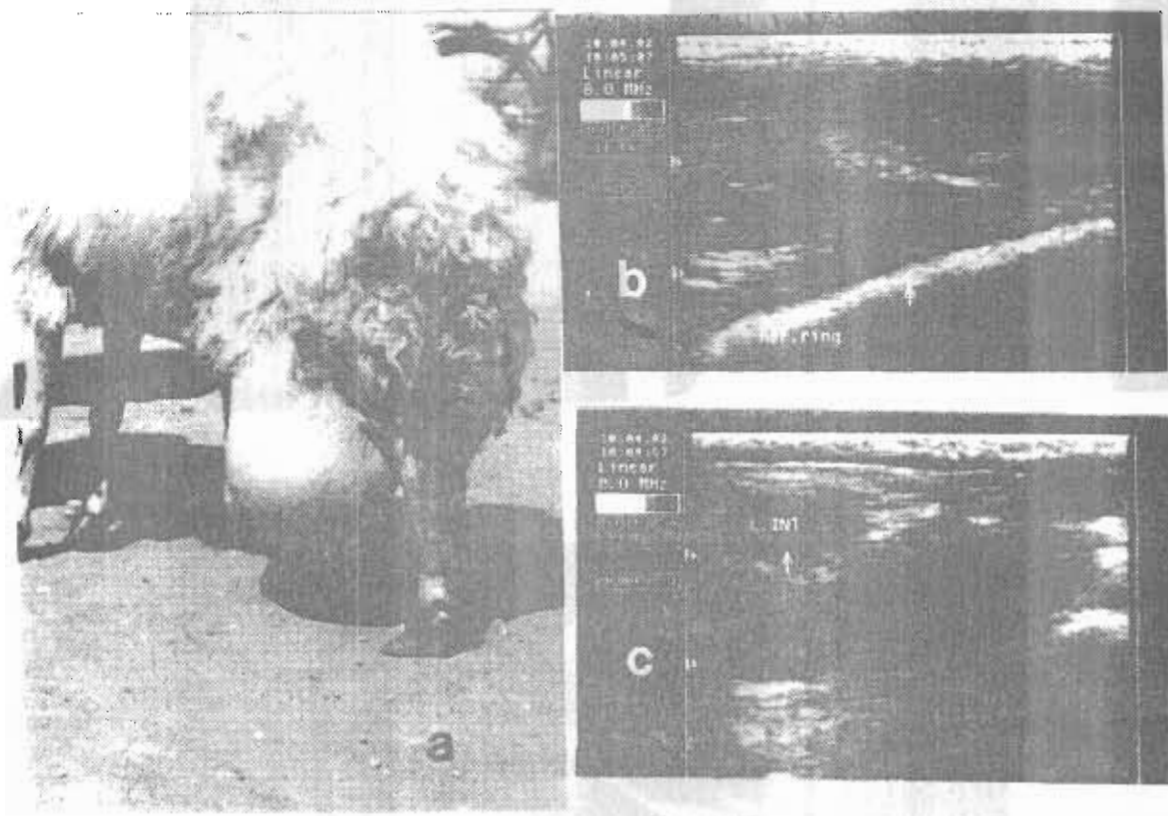


Fig 5 : Pendulous udder in a ewe (a), ultrasonogram of pendulous udder showing the interruption of the hyperechoic wall and illustrating the presence of the bowel subcutaneously (b &c).

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الملخص العربى

التشخيص بالموجات فوق الصوتية والتدخل الجراحى لعلاج بعض الأورام حول مستوى الضرع فى الأبقار والأغنام والماعز

المشتركون فى البحث

حسين المغربى

قسم الجراحة - كلية الطب البيطرى - جامعة الزقازيق - فرع بنها

أجريت هذه الدراسة على عدد خمسة عشر حيوان من الأبقار والأغنام والماعز تعانى من أورام مختلفة حول مستوى الضرع، ولقد أستهدفت هذه الدراسة بيان صورة الموجات فوق الصوتية لمختلف تلك الإصابات وكيفية إستخدام تلك الآلية الحديثة للتشخيص المقارن لها. كما تم التدخل الجراحى لعلاج تلك الإصابات بالطريقة المناسبة لكل إصابة على حدة، وقد كانت تلك الأورام بسبب تجمعات دموية أو تجمعات مصلية أو فتاقات أو خراجات، وقد سجلت نتائج هذه الدراسة وتم مناقشتها تفصيلاً.

ومن خلال تلك الدراسة تم بيان صورة الموجات فوق الصوتية والتدخل الجراحى لماعز تعانى من فتق حول مستوى الضرع إشملت محتوياته على رحم به جنينين على قيد الحياة ولقد ساهم الفحص بالموجات فوق الصوتية لتحديد عدد الأجنة وحالتهم الصحية قبل التدخل الجراحى والذى تم بإجراء عملية قيصرية عن طريق الفتحة الجراحى فوق مستوى الضرع مباشرة.

ولقد أوضحت هذه الدراسة كفاءة إستخدام الموجات فوق الصوتية لفحص الأورام المختلفة حول الضرع وتحديد مدى إمتدادها من عدمه إليه وكذلك تحديد المحتويات الداخلية لتلك الأورام.