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SUMMARY

A retrospective study of 61 calves afflicted with intestinal atresia was performed to determine typical signs of disease, treatment and outcome. All 61 calves, except 2 heifers with atresia ani and rectovaginal fistula, were examined when they were between 1 and 6 days old because of depression, anorexia, abdominal distention, and lack of feces. All calves had been observed to stand and suckle shortly after birth.

Surgery was performed on 21 calves with atresia coli, involving decompression of the distended large intestine followed by colonic anastomosis. 13 calves were discharged. Early postoperative mortality was associated with hypoesthesia and peritonitis. Atresia ani was identified in 39 calves. Five calf were euthanatized because of multiple deformities. The remaining 34 were treated via rectal pull-through to a perineal incision. Four calves died shortly after surgery. All 30 surviving calves progressed normally. Survival appeared to depend principally on early recognition, anatomic site affected, and successful surgical establishment of a patent intestinal tract.

KEY-WORDS : Calves- intestinal atresia- surgical correction-outcome.

Introduction

Intestinal atresia has been reported as a congenital defect in all species of domestic mammals [22] and in human beings [4]. Any intestinal segment from the duodenum to the anus may be atretic. In calves, most frequent cite lesions in the jejunum [16,22], ileum [10,15], colon [5,6,11,16,22], or anus [13,16]. The most frequent malformations are atresia coli and atresia ani [16,22].

Four major types of intestinal atresia have been described [8,19,22,23]. Type I atresia is a mucosal blockage within the intestinal lumen. In animals with type II atresia, the proximal segment terminates in a blind end and the distal segment beings similarly with 2 ends being joined by a fibrous cord devoid of lumen. Type III a atresia is similar to type II except that the proximal and the distal blind ends are completely seperated and there is a mesenteric defect corresponding to the missing segment of intestine. Animals with type III b atresia have a coiled distal segment of intestine. Type IV atresia involves multiple sites of atresia.

The prognosis for surgical repair of atresia coli in calves was poor [7,9,19], and reports of successful outcome following surgery were rare [3,18]. Recently, the survival of calves undergoing treatment for intestinal atresia has improved, with the short-term survival rate ranging 43 to 71%[6,11]. Surgical treatment involves establishing a patent intestinal tract, either through bypass of the atretic small intestinal or colonic segment by use of anastomosis or by establishment of a perineal opening in animals with atresia ani. The purpose of this study reported hier was to describe the clinical history, treatment, and outcome in 61 calves evaluated at the University of Adnan Menderes for intestinal atresia.

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Materials and Methods

The case records of 61 calves referred to the University of Adnan Menderes, Aydin between January 1999 and December 2003, with the final diagnosis of an intestinal atresia, were reviewed. The signalement, history, physical examination findings, surgical management, and outcome were obtained from the medical records for each calf with intestinal atresia. Definitive diagnosis was determined by results of physical examination in 39 calves with atresia ani, or at exploratory celiotomy or necropsy in 22 calves. Laboratory results and radiographic findings were obtained when available. Blood samples for analysis were collected immediately before surgery. The owners were contacted by telephone after release of the calf to obtain follow-up information.

Results

The mean age of the calves with atresia coli (15 females, 7 males) at the time of initial corrective surgical procedure was 3.2 days (range, 2 to 6 days) and there was 2.1 days (range, 1 to 4 days) of the calves with atresia ani. All affected calves nursed normally immediately after birth, then has a variable decrease in appetite. Most calves were inappetent after 24 hours. Bilateral abdominal distention was a consistent physical finding. None of calves had evidence of feces. Clear or blood-tinged mucus was passed spontaneously in some instances, or was detected during digital palpation per rectum. Abnormal findings of physical examination included fever (7/22 with atresia coli; 24/39 with atresia ani), tachypnea (15/22 with atresia coli; 15/39 with atresia ani) and hypotermie (4/22 with atresia coli; 6/39 with atresia ani). Atresia coli was suspected before surgery on the basis of results of plain and contrast radiography performed on 3 calves. Multiple gas- and ingesta-distended loops of intestine and small terminal portion of the colon were seen on plain radiographs. After barium enema, the contrast material outlined the descending colon, which terminated blindly. The small luminal diameter of the distal portion of the colon and rectum was consistent with disease atrophy. White blood cell (WBC) counts were obtained on 15 calves. The WBC counts were typically high and neutrophilia was observed in many calves. Clinical signs of dehydration with corresponding hemocancentration were observed in many calves, however, the plasma protein concentration were normal. Serum biochemical analyses were performed on 20 calves. Plasma creatinine concentration ranged from normal to moderately high. Glucose concentration ranged from low to normal. Plasma electrolyte concentration did not differ significantly from normal value.

To reduce the risk of anesthetic death, treatment of dehydration and acid-base, electrolyte, and serum glucose concentration imbalances by IV administration of fluids was begun before induction of general or epidural anesthesia. Broad-spectrum antibiotics (potassium penicillinle and streptomicine, IV) were given.

Atresia coli - Calf 22 with atresia coli was euthanatized before surgery because it was comatose. Surgery was attempted on the remaining 21 calves with atresia coli. General anesthesia was induced with xylazine and maintained with slow IV ketamin administration. The abdomen was entered through a right paralumbar fossa incision. The cecal apex was isolated ventral to the incision, and the remaining viscera were packed off with saline-moistened towels or laparotomy sponges. Meconium, gas, and fluid were removed as completely as possible through a 3- to 5-cm typhlotomy incision made at the cecal apex. The typhlotomy was then closed. The colon was traced and the atretic area identified. As previously described, a modified type IIIa atresia of the spiral loop of the ascending colon was found in all calves. A side-to-side anastomosis between spiral colon and descending colon was performed 14 calves. The descending colon was identified at surgery by retrograde passage of a soft flexible tube through the anus. The anastomotic site was usually immediately adjacent to the proximal blind end of the spiral colon, and no attempt was made to resect portion of the distended colon. The anastomosis was performed. Calf 20 and 21 were euthanatized at surgery because the colon had already ruptured. In the remaining 5 calves, appropriate sections of colon could not be apposed because of the magnitude of the defect. A ventral colostomy was performed in this calves. Of the 19 calves that recovered from anesthesia, 13 were discharged from the hospital. Six calves died within 8 hours after surgery. Three of these calves had hypotermie. In the remaining three calves, the septicemie with peritonitis was associated. Nine calves died from 1 to 28 days after surgery. Two of the 13 calves discharged from the hospital grew normally.

Atresia ani - 39 calves between 2 and 6 days old were referred for correction of atresia ani. Anal reconstruction on calves under epidural anesthesia with lidocain. Five calf were euthanatized because of multiple deformities. The remaining 34 were treated via rectal pull-through to a perineal incision. Four calves died shortly after surgery. All 30 surviving calves progressed normally.

Discussion

The history and physical examination findings in calves with intestinal atresia frequently are similar. Most affected calves initially will stand and suckle normally after birth. The time to onset of clinical signs of disease may vary from 1 to 6 days, calves with lesions in the proximal segments or with atresia ani may be affected slightly earlier. The principal clinical signs of disease are depression, anorexia, and abdominal distention. Frequently, the owner has not seen the calf pass meconium or feces. Thick mucus may be passed through the anus if it is patent or through the vagina in heifers contamitant rectovaginal fistula. In calves with atresia ani, the owners may have noticed the defect when attempting to administer an enema or while obtaining a rectal temperature reading.

The diagnosis of intestinal atresia is often presumptive based on the age, history, and physical examination findings. Atresia ani can be diagnosed by visual inspection of the perineal region or by limited digital palpation if a vestigial anal opening is present. Further diagnostic testing or surgery is required for confirmation of intestinal atresia in a more proximal location.

Exploratory laparotomy or necropsy must be performed for confirmation of the diagnosis and identification of affected segments located proximal to the anus. In calves with either small intestinal atresia or atresia coli, the intestinal portion proximal to the atretic segment is distented with gas and ingesta.

Most calves admitted were in critical condition. Survival was largely dependent on the calf's condition at referral and on the intestinal segment affected. Preoperative assessment and correction of dehydration, acid-base, and serum electrolyte and glucose concentration imbalances is essential, particularly if general anesthesia necessary. Owing to their clinical condition, atretic calves are potentially at increased risk.
of death while under general anesthesia. Careful, expedient preparation before surgery and monitoring during surgery is necessary to manage these often critically ill animals.

Surgical correction of atresia ani involves the establishment of a patient opening of the intestinal tract in the perineal region. In this study, all calves underwent anal construction via a cruciate incision ventral to the base of the tail. Both subsequently developed anal stricture necessitating surgical revision.

Many procedures have been used to correct atresia coli or jejuna. STEENHAUT et al. [19] recommend right flank colostomy if the entire colon and rectum are involved. Postoperative complications such as prolapse of the colon and unacceptable esthetic results limited the feasible application of the procedure. The same authors performed 4 two-layer handsewn colorectal side-to-side anastomoses in calves with atresia coli, but all 4 calves died within 24 to 48 hours after surgery. Necropsy revealed intact anastomoses and patent intestinal lumen, but functional obstruction developed between the distended, aperistaltic proximal segment and the atrophic rectum.

The pathogenesis of intestinal atresia is unknown. Environmental toxins or infective agents have not been reported [19]. One report cites atresia coli in 1 identical twin Simmental calf [9]; the other twin was clinically normal. The calves resulted from embryo transfer of a single embryo and subsequent cleavage in the recipient cow. Blood typing and electrophoretic patterns of 3 proteins (2 derived from noncirculating tissues) confirmed genetic identity. This finding may support an in utero, nonheritable origin for atresia coli. LOUW [12] speculated that in utero disruption of the mesenteric vasculature may lead to failure of normal intestinal development. Intestinal atresia has been experimentally induced by ligation of mesenteric vessels in fetal pups [12], lambs [5], rabbits [21], and chickens [20].

Palpation of the amniotic vesicle at the time of pregnancy examination during the period of principle organogenesis, between 36 and 42 days of gestation, has been implicated as a cause of intestinal atresia [1,2,14]. In one retrospective study [12], 28 of 524 calves were born with intestinal atresia when the dam had been palpated up to 40 days after insemination, whereas none of 995 calves whose dam was palpated after day 39 (n = 45) were not born with intestinal atresia. Calves in which either only the ‘egg membrane’ was palpated the amniotic vesicle once daily between 32 and 41 days after insemination, whereas none of 995 calves whose dam was palpated later than 40 days after insemination suffered from intestinal atresia. In a prospective study, the same investigators palpated the amniotic vesicle during the period of principal organogenesis, between 36 and 42 days of gestation, and the atrophic rectum.

The heritability of intestinal atresia is controversial and poorly understood. Atresia ani has been reported to be a heritable condition in pigs and calves. Atresia ilei, mediated by an autosomal recessive gene, has been reported to be heritable on Swedish Highland cattle. Atresia jejuna is reported to be heritable, though without evidence of such, in Jersey cattle. In one study, 129 cases of atresia coli were observed over 2.5 years; calves were sired by 15 bulls that were genetically unique.

Calves with atresia ani should be examined closely for other congenital abnormalities, including some involving the urinary tract (renal agenesis, horseshoe kidney, polycystic kidney), genital tract (rectovaginal fistula, cryptorchidism), CNS (spinal dysraphia and lack of the cauda equina), and skeletal system (coccygeal or sacral vertebral agenesis). Multiple abnormalities were observed in 5 of our 39 calves with atresia ani. Two calves had rectovaginal fistule. Correction of atresia ani may not be warranted in animals with severe multiple deformities, and future breeding use should be discouraged.

References