

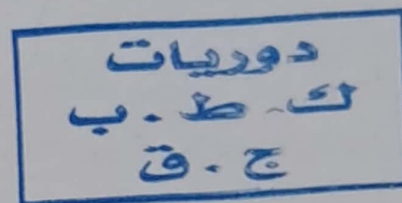
MANAGEMENT OF LARGE COLON IMPACTION IN HORSES

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SUMMARY

Large colon impaction was diagnosed in 23 working horses of mixed breed. The clinical signs, diagnostic features and treatments were evaluated and described. Transrectal palpation was helpful in identifying the impaction location, as being pelvic flexure in 7 horses (30.43 %) and right dorsal colon in 16 horses (69.57 %). The horses were classified according to their response to analgesic medication into moderate (medical cases) and severe (surgical cases).

Flunixin meglumine (0.5 mg/kg. b.w. iv, q 6 h), xylazine (0.25 - 0.5 mg/kg. b.w. iv, q 4 h), paraffin oil (2L/450 kg.b.w.) and intravenous fluids (1-2 L/h) were administered for all cases, while laparo-colotomy was adopted in severe cases. The medically treated cases (17) required 1 to 4

days to solve the impaction with good prognosis. The severe surgically treated cases (6) were subjected to flank laparo-colotomy with good success rate was 83.33% (5 from 6 cases). The clinico-laboratory results obtained from these series showed no detrimental changes in the medical cases, while the surgical cases showed a significant increase in heart rate, respiratory rate and prolonged capillary refill time. In addition, some alterations in their blood and serum biochemical constituents were detected.

INTRODUCTION

Impaction of the intestinal tract is common in horses, causing nearly one third of various types of colic (Tennant et al., 1972; White, 1990 and Baxter, 1992). The various clinical signs, diagnosis and medical or surgical management of impaction of the cecum, ileum, duodenum and

stomach in horses have been reported elsewhere (Owen et al., 1987 and Bohanon, 1988). Large colon impaction often develops at sites of narrowed luminal diameter such as the pelvic flexure or just proximal to the transverse colon in the right dorsal colon (Sullins, 1990). Equine gastrointestinal tract are anatomically predisposed to colonic malposition, for the exceedingly voluminous and potentially movable colon (Bennett, 1972; DeBoom, 1975; Ross and Hanson, 1992). The causes of impaction of the large colon are uncertain, however, poor quality feed, old age, debilitation, poor dentition, parasitism, overeating, inadequate water intake, motility disorders and limited exercise have been indicated (Ohman, 1984; Sellers and Lowe, 1986 and Sullins, 1990).

Reviewing the literatures, little work has been done on the management of large colon impaction or its effect on blood parameters that may yield the information about diagnosis, prognosis and treatment when interpreted in conjunction with other parts of the patient's database. Therefore, this study presents the findings of 23 horses affected with large colon impaction in relation to their clinical, diagnostic features and therapeutic approach. This might be helpful in the management of similar cases encountered in future.

MATERIAL AND METHODS

Twenty-three draft horses of mixed breed (16

mares and 7 stallions), five to twenty years of age, were referred to Surgery and Internal Medicine Clinics, Faculty of Veterinary Medicine, Cairo University, with signs of colic, between January (1992) and June (1999).

Diagnosis of the cases depended on the history and clinical examination. Relevant historical details included duration of colic, changes in management and diet, recent drug administration, previous colic episodes and method of treatment adopted. The clinical examination included rectal temperature, heart rate, respiratory rate, capillary refill time, mucous membrane, gut sounds and rectal palpation. After rectal palpation, each horse received 3,000 i.u. antitetanic serum parentally.

Blood samples were obtained from diseased horses as well as from 10 normal horses as a control group for some hematological and serum biochemical analysis. The estimated parameters included packed cell volume (pcv), total protein, glucose, calcium, inorganic phosphorus, chloride, sodium and potassium. Packed cell volume was assessed according to Sonnewirth and Jarek (1980). Serum biochemical analyses were determined according to the methods described in the commercial reagent kits produced by Bio-Mereux, France. Sodium and potassium were estimated according to (Willard et al., 1965) by using Flame-photometer. Statistical analysis of data was performed according to the method of Snedecor and Cochran (1967), using T-test.

Depending on the response to therapeutic medication, the animals were divided into two groups: 17 horses that had moderate pain and were responding to analgesic medication (medical cases) and 6 horses that had severe pain, not responding to analgesic medication (surgical cases). All cases suffered from an acute onset of abdominal pain and were diagnosed as large colon impaction.

The therapeutic regimen included flunixin meglumine (0.5mg/kg.b.w.iv, q 6 h), xylazine (0.25-0.5mg/kg.b.w.iv, q 4 h). Paraffin oil (2L/450kg b.w.) mixed with warm water in a ratio of 1:1/4 volume was given via stomach tube and intravenous infusion fluids composed of 0.9% saline and Ringer's solution, with infusion rate (1-2 L/h) for each case.

The other 6 horses which were not responsive to

therapeutic medication (surgical cases) became subjected to laparotomy after intravenous anaesthesia using xylazine Hcl (1.1 mg/kg.b.w.), ketamine Hcl (2.2 mg/kg.b.w.) and chloral hydrate (1gm/10 kg.b.w.10% solution) via jugular vein catheter. Ringer's solution and normal saline were also intravenously infused during surgery. After aseptic preparation of the right flank region for cases of right dorsal colon impaction and left flank region for cases of pelvic flexure impaction, linear infiltration of xylocaine Hcl 2% was employed. Twenty-five cm. long grid incision was made to get through the abdominal cavity. The abdominal viscera were exposed, and the bowel decompressed by suction. The site of decompression was closed by purse-string suture. The impacted colon was injected with about 5 liters of warm saline 0.9% intraluminally, and then subjected to gentle massage to soften the impacted ingesta. Through a 10 cm. colotomy, either in

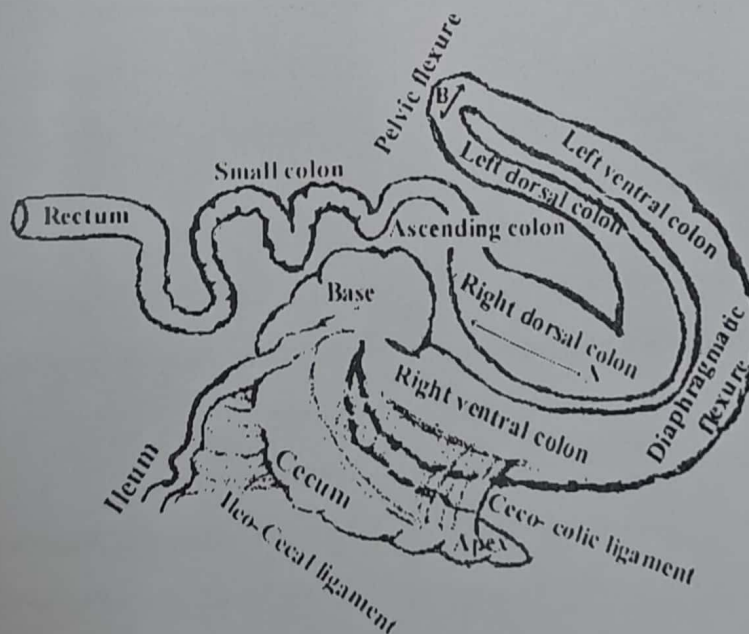


Fig. (1): Schematic diagram of cecum and colon in equine. A and B are the sites of colotomies.

the right dorsal colon (4 cases) or pelvic flexure (2 cases) as shown in figure (1), the softened ingesta was cautiously removed.

Colotomy was then apposed by lembert's pattern, using vicryl 2/0. The exteriorized bowels were protected by sterile towels moistened with warm saline 0.9% solution, cautiously reposed intra-abdominal and the laparotomy wound was closed routinely. Systemic gentamycin sulphate (1.8 mg./kg.b.w.) and procaine penicillin (22,000 iu/kg.b.w.) were injected intramuscularly for 5 days. On the second day of surgery, paraffin oil (2L / 450 kg) was administered via nasogastric tube. A dose of neostigmine (2-4 mg, i/m, s.i.d.) was also injected. Ringer's solution and normal saline were also intravenously given till the third day, whereas easily digestible food composed of boiled barely water and bran mash and water ad libidum were offered after return of borborygmi.

RESULTS

The clinical findings of medical cases (17) were anorexia, slight depression, decreased fecal production, occasionally flank looking, stretched neck and curled up upper lips and some of them stretched more often than usual to urinate. Rectal examination revealed scanty feces, often mucus covered dry texture. Firm enlargement was also detected in the form of large column caused by impaction of feces in the large colon. Impaction was located in the pelvic flexure in 5 horses and

in the right dorsal colon in 12 horses. Auscultation usually revealed decreased gut sounds. The colic episodes lasted up to 24 hrs in 8 horses and protracted to 48 hr in 9 horses after the use of medical treatment.

The surgical cases were outstretched in their colic for more than 72 hours and exhibited depression, anorexia, exhaustion, frequent tendency to lie down, crouching and rolling over the back, slightly elevated body temperature, somewhat cold extremities, reduced skin elasticity and audible but not high pitched borborygmi. Trials to treat them medicinally were unfruitful and required surgery.

Clinical examination (table and diagram-1) revealed that the medical cases (17/23) showed non-significant changes, while the surgical cases (6/23) showed a significant increase in heart rate, respiratory rate and prolonged capillary refill time. The color of mucous membrane changed to congested membrane with dull brownish ecchymosis.

PCV and serum biochemical analysis (table and diagram 2) showed non-significant changes in the medical cases but significant changes in the surgical cases.

During surgery, the obstructing mass located either in the right dorsal colon or pelvic flexure was firm fibrous column, hard to be broken and coated with mucus secretion.

The postoperative care was directed toward medications and wound dressing, sutures were removed 10 days post-operation.

Survival rate of operated cases were 5 from 6 cases and healing of the laparotomy wound was by first intention.

The gut sound was detected 24 hours after the operation and feces were soft and dark in color with offensive odour.

The rectal body temperature, heart rate, respiration rate, capillary refill time and mucus membranes color were within the normal level as the control horses after that time.

Table and Diagram (1): Clinical examination of horses suffering from large colon impaction (medical and surgical cases) MV $\pm$ SE.

Variables	Control (10 horses)	Large colon impaction	
		Medical cases (17) horses	Surgical cases (6 horses)
Rectal temperature ($^{\circ}$ C)	37.88 $\pm$ 0.109	37.994 $\pm$ 0.084	39.283 $\pm$ 0.253
Heart rate (beats /min)	33.7 $\pm$ 1.460	36.823 $\pm$ 1.906	63.166 $\pm$ 4.300***
Respiratory rate (breaths / min)	12.1 $\pm$ 0.924	13.7045 $\pm$ 0.839	24.333 $\pm$ 2.123***
Capillary refill time (second)	2.0 $\pm$ 0.210	2.47 $\pm$ 0.486	3.833 $\pm$ 0.307***
Mucous membranes	Pale rosy red	Rosy red	Congested with dull brownish ecchymosis

*** P $\leq$ 0.01

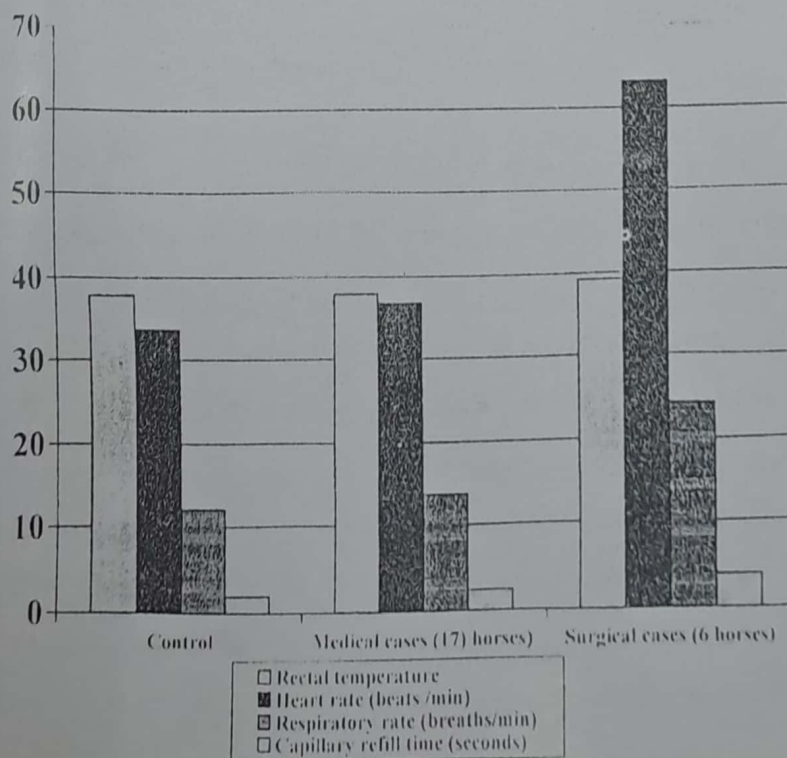


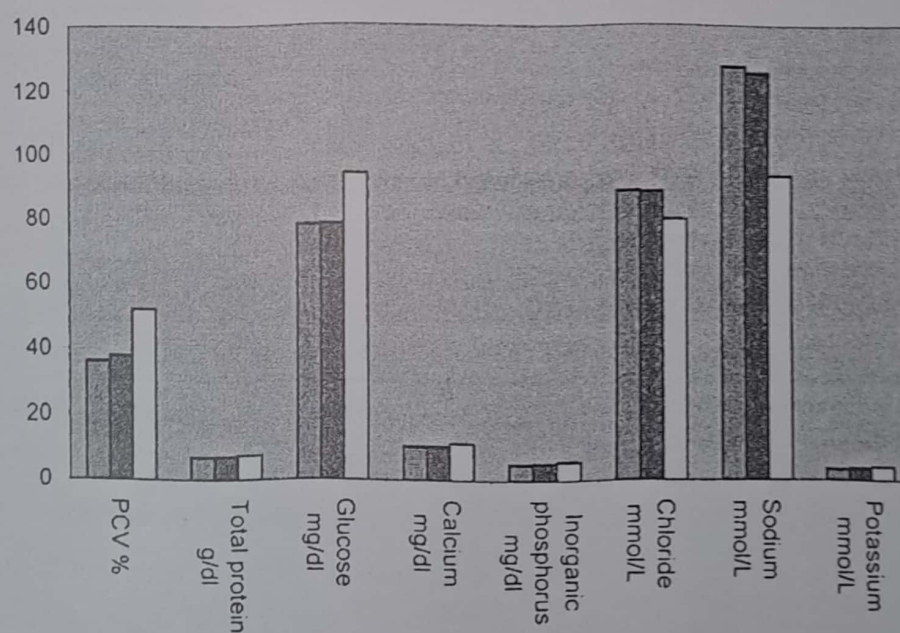
Table and Diagram (2): Some blood (pcv) and serum biochemical constituent of horses suffering from large colon impaction (medical and surgical cases) MV± SE .

Variables	Control (10 horses)	Large colon impaction	
		Medical cases (17) horses	Surgical cases (6 horses)
PCV%	36.20 ± 1.030	37.76 ± 0.633	52.00 ± 2.338*
Total protein g/dl	7.10 ± 0.063	7.20 ± 0.242	7.50 ± 0.136*
Glucose mg/dl	77.70 ± 0.789	78.00 ± 0.641	93.83 ± 4.315**
Calcium mg/dl	10.34 ± 0.272	10.45 ± 0.186	11.33 ± 0.128**
Inorganic phosphorus mg/dl	5.24 ± 0.108	5.39 ± 0.083	5.83 ± 0.154*
Chloride mmol/L	88.60 ± 0.541	88.06 ± 1.155	79.33 ± 2.654**
Sodium mmol/L	127.30 ± 0.633	125.35 ± 1.322	93.00 ± 1.570***
Potassium mmol/L	3.51 ± 0.086	3.70 ± 0.066	4.08 ± 0.303

* P≤0.05

** P≤0.01

** *P≤0.001



the surviving animals were returned to normal condition and work after one month of the surgery.

DISCUSSION

The present study showed that colon impaction could develop in horses of any age and sex. Large colon impaction is not restricted to old horses that commonly have mastication problem, as proven by Dabareiner and White (1995). There is no reported association between the sex of affected horses and impaction, it has been suggested that pregnant and post-parturient mares are more likely to develop large colon impaction (Tennant et al., 1972; Snyder et al., 1989 and Hillier and Mair, 1997).

The etiological factors causing recent large colon impaction in this study may be related to an inadequate water intake Pugh and Thompson (1992) or changes in the feeding practices which may have upset normal intestinal motility pattern (Lowe et al., 1980). Adequate exercise may also be important in maintaining normal large intestine function in horses (Orton et al., 1985 and Pearson and Merritt, 1991).

The severity of pain was graded depending on analgesic medication (combination of finadyne and xylazine) response as moderate cases (17/23) requiring analgesic medication up to 48 hours and severe cases (6/23) irresponsive to analgesic

medication and required surgery as mentioned by Synder et al., (1989).

The majority of horses (17/23 or 73.9%) in the present study were of mild cases; showed non significant changes in rectal temperature, respiratory rate, capillary refilling time and mucous membrane, and respond to the medical treatment that comprised intravenous administration of fluids, sedatives, analgesic and non-steroidal anti-inflammatory drugs. The medication was given to control pain, reduce intestinal spasm in the area around the impaction and soften the luminal contents of the colon to allow passage of feces and establish normal intestinal function. A relief of visceral pain helps to reverse the effects of adrenergic inhibition of intestinal motility (Sellers and Lowe, 1986). However, as a prognostic means, the surgical cases showed significant changes in the heart rate, respiratory rate and mucous membrane but slight non-significant change in the rectal temperature. The increase in heart rate may be attributed to severe distention of the colon, severe colic and dehydration. These results coincided with Wilson and Gordon (1987), Synder et al., (1989), Sivula (1991) and Mair and Lucke (1992). The increase in respiratory rate may be due to excitement, distended colon or a response to pain. Prolonged capillary refill time indicate diminished peripheral perfusion, moderate dehydration and reduced cardiovascular function which occurred in the severe surgical cases (Wilson and Gordon, 1987).

Xylazine causes sedation, analgesia and bradycardia (White, 1990) and also reduces jejunal and colonic motility for up to 2 hours (Davis et al., 1977), which may be beneficial in relieving intestinal spasm around the obstruction. In turn, these effects may allow fluid absorption into the mass and the release of gas. Repeated treatment with xylazine was often necessary to relieve evidence of visceral pain during the time required to hydrate and soften the impaction, in addition to its potential effect for limiting colonic motility (Sellers et al., 1987). However, the reduced dose of xylazine to 0.5mg/kg. IV, revealed that it can be used effectively for treatment of large colon impaction in horses without adverse side effects (Dabareiner and White, 1995).

Flunixin meglumine is the most effective of the NSAIDs used to inhibit prostaglandin mediated visceral pain during intestinal obstruction or distention (Davis and Knight, 1977) and reduces the systemically evident effects of endotoxins release (Moore et al., 1994) but apparently does not inhibit colon motility (Davis and Knight, 1977). Flunixin meglumine can mask clinical signs of endotoxaemia as well as intestinal distention and strangulation by reducing heart rate, relieving pain and improving mucous membrane colour (Dabareiner and White, 1995).

Fluid therapy was established to hydrate and break up the impaction and to maintain intravas-

cular volume. Measurement of PCV and total protein were essential in estimation of intravascular volume (Carlson, 1985). The other laboratory tests include estimation of sodium, potassium and chloride are thought to have advantages in the evaluation of fluid deficits, specially during surgical or traumatic blood loss (Wilson and Gordon, 1987 and Schmall, 1992).

Paraffin oil as a laxative was given to all colic horses, to increase the water content and softness of ingesta that help in evacuation of impacted colon. It is administered via nasogastric tube (2 L/450 Kg.), prior to its administration, mixed thoroughly with warm water (1: $\frac{1}{4}$ ratio) to decrease its viscosity and facilitate its administration under gravity flow (Mair and Edwards, 1998).

In this study, the pelvic flexure and the right dorsal colon were the main sites of impaction in horses, concurrent with the findings of Sullins (1990) and Dabareiner and White (1995).

The recorded site for laparotomy in equine was either through the ventral midline approach (Johnson, 1970; El-Sheikh and Shokry, 1976; Jones, 1977 and White, 1990) or through the flank approach (Lammers, 1968 and Coffman and Garner, 1973). Although the ventral midline approach gave wide operative field where most of the viscera became readily accessible (Donald, 1950 and Johnson, 1970), the flank laparotomy was undertaken in this study together with grid incision and

abdominal retractor, thus facilitated extensive visceral exposure and maneuver (Vaughan, 1972).

Vaughan technique (1972) for flank laparotomy using grid incision was practiced and the abdominal viscera was properly approached and manipulated. The success rate was 5 out of 6 horses. The surviving horses regained their normal condition within 72 hours postoperatively. Complications associated with flank laparotomy were not observed, owing to maintenance of asepsis, minimal trauma to the bowel and careful closures of the abdomen.

The fluid, gas and ingesta that accumulate proximal to the obstructed site arise from several sources including saliva, gastric secretions, swallowed air, pancreatic secretions, bile, gas from bacterial fermentation, ingested fluid and solids and secretions from the intestinal mucosa (Sheilds, 1963 and Jones, 1977), increase the intraluminal hydrostatic pressure which influences microvascular circulation in the mucosa (Ohman, 1984). Incidental right dorsal colon rupture during surgery of one horse, lead to death and may be related to improper manipulation or micro-circulatory changes in the wall of the right dorsal colon caused by impaction. However surgery was very urgent and appropriate for such condition.

In conclusion, moderate cases of large colon impaction can be treated medicinally, while severe cases that do not respond to the analgesic therapy

should be subjected to surgery.

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