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Bharathidasan Murugan
Assistant Professor, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Pratickshaa Premkumar
Postgraduate Scholar, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Mohamad Ali
Assistant Professor, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Sivaranjani S
Postgraduate Scholar, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Aravind R
Postgraduate Scholar, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Mohamad Shafiuzama
Professor and Head, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Corresponding Author:
Pratickshaa Premkumar
Postgraduate Scholar, Department of Veterinary Surgery and Radiology, Madras Veterinary College, Chennai, Tamil Nadu, India

Surgical management of GDV in a Chow Chow dog

Bharathidasan Murugan, Pratickshaa Premkumar, Mohamad Ali, Sivaranjani S, Aravind R and Mohamad Shafiuzama

Abstract
Gastric dilatation and volvulus is commonly encountered in deep-chested dogs characterized by gastric distension and malposition. A four-year-old female Chow Chow weighing 30 kg was reported to the Small Animal Surgery Outpatient Unit of Madras Veterinary College with a history of dyspnoea, tachycardia, tachypnoea, and severe abdominal bloating, which had a tympanic sound on percussion. The capillary refill time was less than 3 seconds. The heart rate was 234 per minute, and the respiratory rate was 65 per minute. Haematology revealed a mild reduction in PCV, and serum biochemistry results revealed hypokalemia. Thoracic and right lateral abdominal radiographs revealed severe gastric dilatation with a double bubble appearance. An ECG was taken before surgery, which indicated ventricular tachycardia. A stomach tube was passed to decompress the stomach, and antioxidant therapy was initiated. Laparotomy was performed, the stomach was derotated, and the stomach tube was passed to empty the contents. A gastrotomy incision was made to remove large bone pieces and was closed using a simple continuous pattern followed by a Cushing pattern. The spleen was normal, and incisional gastropexy was performed. The animal was monitored postoperatively for 96 hours. The animal had a successful recovery.

Keywords: Incisional gastropexy, Chow Chow, Hypokalaemia

1. Introduction
GDV is common in large and purebred dogs and the incidence increases with an increase in age. Animals fed with particle sizes less than 30 mm are more prone to GDV (Glickman *et al*., 2000) [1]. Chow Chow have broad, deep and muscular chests, so they are more prone to GDV. Of a total of 80 deaths, 16 were due to GDV in Chow Chow. Except for the basset hound and Chow Chow, all of the breeds that looked to be at greater risk of morbidity or fatality owing to GDV were large or gigantic breeds (Evans 2010) [2]. Predisposing factors include dietary and non-dietary factors such as anatomy and inheritance. Dietary factors include small food particle size, feeding habit, feeding a large meal once a day, feeding from an elevated bowl, eating rapidly (in large but not giant breeds), aerophagia, dry foods containing an oil or fat (Raghavan *et al*., 2006) [3]. Non-dietary factors include older age, male gender, lean body condition, increased thoracic depth-to-width ratio, increased length of hepatogastric ligament, first-degree relative with a history of gastric dilation volvulus, aggressive or fearful temperament (Glickman *et al*., 1997, Raghavan *et al*., 2004, Elwood *et al*., 1998) [4,5,6]. Unlike other breeds, predisposed to GDV Chow Chow is a medium-sized dog with a square body frame. The incidence of GDV in Chow Chow is recorded less hence this article documents one such incidence.

2. History, clinical signs and diagnosis
The current case consists of a 4-year-old female Chow Chow weighing 30 kg reported to the Casualty Unit of Madras Veterinary College with a history of feeding huge quantity of rice and chicken per meal 6 hours before bloating, restlessness, agitation, abdominal distension and unproductive vomiting, respiratory distress with open mouth breathing (Fig 1), tachypnoea and tachycardia. The animal had a depressed mentation. On physical examination, the tympanic sound was heard on percussion. The temperature was 106˚F and the congested mucous membrane and Capillary refill time was less than 3 seconds. Heart rate was 234 per minute and respiratory rate was 65 per minute. ECG was taken which showed Ventricular Tachycardia. Right lateral abdominal radiography revealed a double bubble signifying air accumulation in the fundus and pylorus. A complete blood count revealed a stress leukogram and mild reduction in PCV and platelets. Serum biochemistry revealed hypokalaemia.

3. Treatment

Medical management for shock with crystalloid resuscitation was done @90ml/kg/hr b.wt. using 20G intravenous catheters in both cephalic veins (Fig 2) initially one-fourth of the shock dose was given as the heart rate did not reduce one more quarter dose was given followed by colloidal therapy with hetastarch @10ml/kg and KCl @0.5 mEq/kg/hr is given to manage hypokalaemia. Dexamethasone sodium phosphate @5mg/kg IV and Ceftriaxone @20mg/kg IV were given to address the endotoxic shock. To reduce Ischemia Reperfusion Injury before gastric derotation, Lidocaine bolus dose of 2mg/kg IV was given and N-Acetyl Cysteine was given @150mg/kg IV followed by CRI dose of 50mg/kg IV every 4 hrs. After sedation using Butorphanol @0.2mg/kg IV, Diazepam @0.25mg/kg IV and induced with Propofol @4mg/kg IV and Endotracheal intubation performed and maintained with Isoflurane, 100% oxygen supplementation then lubricant was applied and orogastric intubation(Fig 3) was performed by keeping the one end of the tube lower than the animal into an emptying container and midventral celiotomy was performed and more than 90 degrees clockwise rotation of pylorus was present and stomach was derotated and lavaged and contents were evacuated. Partial splenic torsion was noticed and rectified, and mild congestion of the spleen was noticed. After placing the laparotomy sponge, stay sutures placed using 3-0 polyamide to lift the stomach. A gastrotomy incision was made to remove big bone particles and the stomach was lavaged using warm saline and suctioned out using a suction pump. The gastrotomy incision was closed using PGA 3-0 in a simple continuous pattern followed by a Cushing pattern. Incisional gastropexy was performed on the right abdominal wall at the level of the pyloric antrum. A 3 cm incision was placed on the right transverse abdominis muscle and the pyloric antrum and wall are closed using 2-0 PGA in a simple continuous pattern and gastropexy was performed. Linea alba was closed using PGA 2-0 in Ford interlocking pattern and skin was closed by Polyamide 2-0 in cross mattress pattern. Postoperatively animal was monitored continuously for 48 hrs under electrocardiography and Ventricular tachycardia was present which was managed by using Lidocaine and N acetyl cysteine CRI. No water or food is offered for 48 hrs after surgery. H2 blocker Ranitidine was given @2 mg/kg I/M twice daily.

Fig 1: Open mouth breathing

Fig 2: Rapid fluid therapy with catheterization on both cephalic vein

Fig 3: Atttempting to decompress with stomach tube

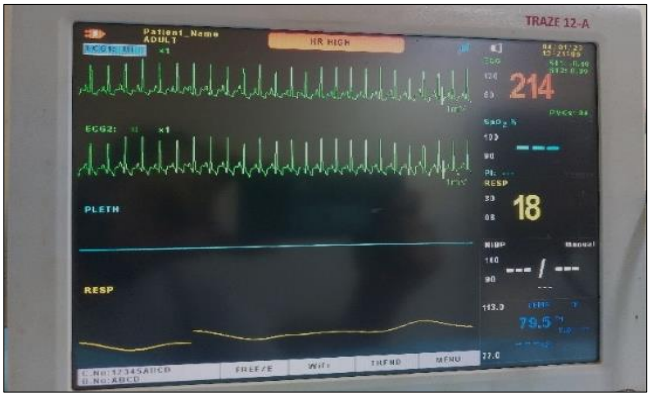

Fig 4: Making a gastrotomy incision

Fig 5: Ventricular Tachycardia

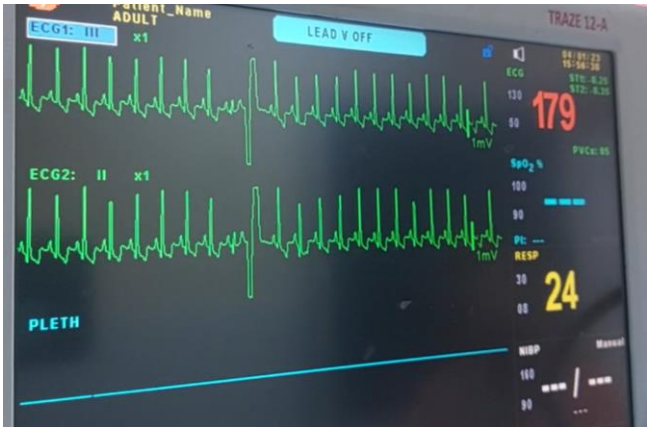

Fig 6: After Antioxidant therapy

Fig 7: Postoperative day 1

4. Discussion

Gastric dilatation, with or without volvulus, is a potentially fatal condition in dogs, with fatality rates ranging from 33% to 68% (Przywara *et al*., 2014) [7]. GDV risk factors include gastrin level elevation, impaired stomach motility, and prolonged gastric emptying time. It is unknown if the stomach rotates first or if it enlarges first in terms of pathophysiological events. It has been proposed that dilation occurs initially because aerophagia is the main reason for gas build-up (Wingfield *et al*., 1974) [8]. However, it appears that volvulus actually happens first because gastropexy almost always stops recurrence (Glickman *et al*., 1998) [9]. Prior to surgical intervention, radiography is recommended to confirm the diagnosis. Radiography is typically done when a patient's condition has stabilised. The preferred radiographic view of the abdomen is the right lateral view (Hathcock, 1984) [10]. Ischemic-reperfusion injury (IRI), which leads to systemic inflammatory response syndrome and multiple organ dysfunction, is the most severe sequelae of GDV. Time (more than 5 hours) between the beginning of clinical symptoms and admission of the patient, a body temperature of 38˚C (100.4˚ F), and hypotension during admission are risk factors for morbidity and mortality (Beck *et al*., 2006) [11]. Gastric viability is determined by the colour, thickness, and post-incision haemorrhage. The necrosed stomach is indicated by the grey colour, thinning, and slippage of the stomach. Although still in study, fluorescein and nuclear scintigraphy can be used (Monnet *et al*., 2020) [12]. Elevated serum lactate concentrations and gastric necrosis have been found to be effective indicators of postoperative complications (Bruchim and Kelmer 2014) [13]. Gastropexy is performed to avoid recurrence as the Gastrohepatic ligament is stretched and it is difficult to retain its original position. Circumcostal, gastrocolopexy, incisional, belt-loop, incorporating, and tube gastropexy are all open-approach types of gastropexy. Grid, laparoscopic, laparoscopic-assisted, and endoscopically aided approaches are all minimally invasive gastropexy methods. Furthermore, the fixation varies based on the type of suture or stapling equipment used for the gastropexy (Monnet *et al*., 2020) [12]. Incisional gastropexy results in less than 5% or no recurrence and it is better than circumcostal gastropexy or gastro colopexy and equally efficient with beltloop gastropexy (Benitez *et al*., 2013) [14].

5. Conclusion

With the exception of the basset hound and chow chow, all giant breed dogs have a very high risk of illness or fatality associated to GDV. Although other authors have claimed that the basset hound is more vulnerable (Burrows and Ignaszewski 1990; Glickman *et al*., 1994) [15,16], the chow chow has not before been discussed in this context. Hence it is important to record the incidence.

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