METROPOLITAN VETERINARY ASSOCIATES
NEWSLETTER
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PECTUS EXCAVATUM

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Pectus excavatum (PE) is an uncommon to rare congenital abnormality of the thoracic wall in cats and, less commonly, dogs. In this condition, the caudal ribs and sternum do not grow properly early in kitten and puppy development, resulting in dorsal deviation of the caudal sternum[1,2]. The deviation typically starts between the 3rd and 5th rib and is most severe at the region of the 10th rib. Despite its rarity, this condition is the most common congenital thoracic wall defect in both human and veterinary patients. In humans, PE is seen in 1:400 live births, and there is a 9:1 male:female sex predilection[1,2]. In the veterinary field, the condition has been described in dogs, cats, lambs, calves, rabbits, and sea otters[2]. Overall, PE is thought to be less common in the veterinary field, and no sex predilection has been noted. Predisposition has been noted in Bengal and Burmese cats, as well as in brachycephalic dogs, most commonly in the Maltese and English Bulldog[3-6].

The etiology of PE is unknown in both veterinary and human patients. The current prevalent theory is a defect in metabolism of the sternocostal cartilage, however the ultimate cause for internal deviation of the sternum is unknown[1]. Leading investigators favor two theories: overgrowth of the costal cartilage or low structural strength of the cartilage[9]. Either way, the condition results in decreased thoracic lung volume, left sided deviation of the heart, decreased cardiopulmonary function, and demonstrable pressure on the right side of the heart [1,2,10, 11]. The defect is present at birth, and becomes readily detectable in most cases within days[2,7]. Typically, the defect worsens with growth and can cause clinical signs secondary to respiratory and cardiac compression, plateauing once growth is complete. Some patients may demonstrate no systemic signs, but in more severe cases dyspnea, exercise intolerance, inappetance, recurrent respiratory infections, weight loss, cough, cyanosis, and heart murmurs are all reported [1,2,7,8]. In humans, chest pain, fatigue, cardiac palpitations, and tachycardia have all been reported as well[1].

Diagnosis of PE is typically made on a physical exam. An indentation located in the caudoventral chest wall can be palpated. Radiographs and advanced imaging have both been used to identify and quantify the severity of the defect, however no imaging measurements or comparisons have been closely correlated with severity of clinical signs and each measurement has drawbacks[12]. The anthropomorphic or clinical index is

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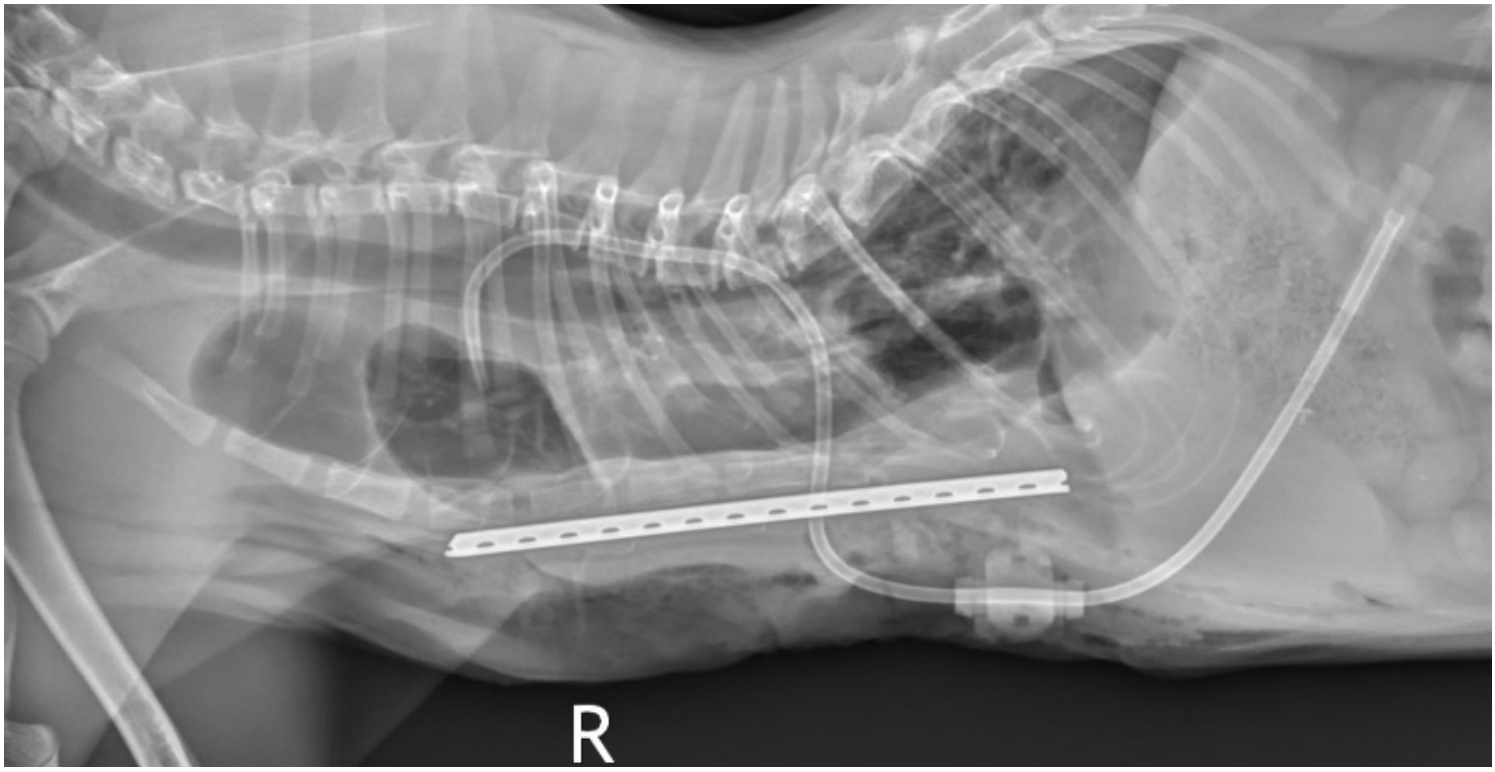
a non-imaging based comparison between the depth of defect and the depth of the thorax[12,13]. The frontosagittal index (FSI) and vertebral index (VI) both rely on radiographs to create a ratio. The FSI compares the width of the thorax at the widest point with the depth of the thorax at the narrowest point, while the VI compares the distance between the dorsal border of the spine and the sternum



at the narrowest point divided by the depth of a vertebral body[12,14]. The Haller Index (HI) is the most commonly used PE index used in people. In this index, the transverse diameter of the chest is divided by the narrowest anterior-posterior distance on a computed tomography (CT) scan axial slice. The Correction Index is another CT based index in which the ratio of distances between the anterior spine and the anterior chest is compared to the distance between the anterior chest and the narrowest point of the defect[12]. CT is less commonly performed in veterinary cases, but was shown to be helpful in determining additional lateralization of the xiphoid and also as a method for determining safe corridors for surgical suture placement[15].

PE treatment options are often related to the degree of underlying clinical signs. Non-surgical treatment in humans include anti-inflammatory medications and acupuncture to treat pain, physical therapy to help strengthen chest muscles, and potentially vacuum bell application in younger patients with more compliant chests [11,17]. In veterinary patients where clinical signs are mild or owners are unable to afford surgical correction, conservative treatment with exercise management, pain control, and monitoring similar to management in non-surgical human cases can be considered, but limited publications exist concerning this method of treatment. In more severe cases or older patients, surgery is required. Many procedures have been described ranging in degree of invasiveness and degree of correction attainable. The Ravitch procedure is an open surgical approach, resection of the abnormal cartilage, and placement of metal bars as support. The Nuss procedure is a less invasive procedure, consisting of a thoracoscopically guided placement of a curved metal bar which, once placed, is flipped to elevate the sternum[1]. A variation on the minimally invasive option, a magnetic mini-mover procedure involves placement of a small magnet and metal bar behind the sternum. A breastplate with a magnet is then worn by the patient to promote elevation of the sternum. In veterinary patients, treatment choice is based on the age of the patient. For older animals, an open approach with resection of the costal cartilage is performed, and an internal splint (i.e. a bone plate) is placed to align the sternum[18]. An open approach to the sternum and external splint is another option for older patients[19]. In animals less than four months of age, the compliance of the thorax allows for a less invasive technique. Circumsternal sutures are placed without a skin incision, then passed through a custom created external splint. The sutures are tied under tension, resulting in elevation of the sternum. Typically, either a thermoplastic splint material or fiberglass tape is used to create the splint at the time of suture placement. The splint is left in place for 3-4 weeks, then removed in conjunction with thoracic radiographs to document expansion and realignment. Complications associated with either surgery include inadvertent puncture of the lungs or heart, pneumothorax, hemorrhage, and re-expansion pulmonary edema, as well as superficial abrasions and bandage sores from the splint[20,21,22]. A single case report of PE correction utilizing video-assisted thoracic surgery (VATS) was recently published in an attempt to decrease the potential for life-threatening complications associated with circumsternal sutures[23]. The authors reported that with establishment of a pneumothorax and visualization, the sutures were able to be passed without issue and theoretically with decreased risk for complications.

Post-operative care in human patients revolves around proper pain management,

and may include placement of epidural catheters in combination with intravenous pain control[16]. This degree of pain is, anecdotally, not seen in veterinary patients and post-operative oral opioids and anti-inflammatories appear to properly control discomfort. For more invasive procedures that include an open approach and cartilage resection, more aggressive intravenous analgesia and local blocks likely improve outcome and overall patient comfort.

Given the less invasive nature of the circumsternal sutures, as well as the general response to therapy in younger animals, early treatment of PE at 8-12 weeks of age is essential in the long term care of these patients. Improved cardiopulmonary function has been documented in human patients, and likely is present in veterinary patients as well. Prognosis is ultimately favorable, and though risks of any procedure are present, most are uncommon to rare. Patients that respond to the initial therapy do not appear to have any relapse or lifelong sequela, and once treated PE in the veterinary patient does not appear to affect the patient's longevity.

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SPECIALIZED SERVICES

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WELCOME TO DRS. SAWYERE AND HANSFORD

Dominique Sawyere, BVSc, MS, DACVS-SA (Surgery Team)

Dr. Dominique Sawyere is a Diplomate of the American College of Veterinary Surgeons. She graduated from Massey University in New Zealand in 2011. Following veterinary school, Dr. Sawyere completed a rotating internship at Veterinary Specialist Group (Auckland, New Zealand) and a surgical internship at Virginia-Maryland College of Veterinary Medicine (VMCVM). She then stayed on at VMCVM for a 3-year surgical residency. Dr. Sawyere completed her residency in 2016 and was boarded the following year. During her residency, Dr. Sawyere completed a masters degree and successfully defended her thesis in regenerative medicine for canine osteoarthritis in 2016. Following her residency, she spent two years in a busy private practice in South Carolina before returning to VMCVM as a clinical assistant professor of surgery for four years.

Dr. Sawyere started at MVA in 2022 and is excited to offer a range of orthopedic and soft tissue procedures. She has a particular interest in canine elbow dysplasia, management of osteoarthritis, arthroscopy, and fracture reconstruction.

When not at work, she enjoys traveling with her husband and son and spending time with their dog and four cats.

Jeremy Hansford, DVM, MS, DACVAA (Anesthesia Team)

Dr. Jeremy Hansford is a Diplomate of the American College of Veterinary Anesthesia and Analgesia. He graduated from the University of Georgia College of Veterinary Medicine in 2012 and continued on to a one-year small animal internship at the Virginia Maryland College of Veterinary Medicine. From 2014-2018 he worked in various small animal general practice clinics in Pennsylvania, Virginia, and South Carolina, including a year in emergency medicine. This time served to spark his passion for veterinary anesthesia, leading to pursuit of an anesthesia residency at the Virgina Maryland College of Veterinary Medicine. Following completion in 2021, he continued as faculty, instructing veterinary students, technicians, and residents while working with large and small animal patients of all kinds!

Although interested in all aspects of anesthesiology, he has a passion for intrathoracic procedures and local anesthetic techniques.

When not busy at work, he enjoys hiking and spending time with his wife, a surgeon here at Metropolitan Veterinary Associates, and young son. Together they also have 4 cats and a Yorkie, which makes for a very busy household!

CPR FOR PET OWNERS

Quarterly we will be holding a CPR class for our community of pet owners so keep a look out of your clients. Our next class will be in January 28, 2023. For questions, please reach out to Sarah Spurgeon at 610-666-6317 or sspurgeon@metro-vet.com

RECOVER TRAINING

CPR (RECOVER INITIATIVE) FOR YOUR TEAM

Our ICU nurse Jessi Moodey, BS, CVT is open to visit your hospital and team for a CPR RECOVER Initiative presentation and hands on training. Please contact Sarah Spurgeon at sspurgeon@metro-vet.com if you are interested.

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If you are interested in coming together with other veterinary management professionals throughout Pennsylvania please contact Patrick Fabricatore at pfabricatore@perkiomenanimalhospital.com.

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