Brachynathia treatment using a tension band device: technique and complications

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Introduction

Incisor arcade malocclusion Type II and III, or mandibular and maxillary brachygnathia respectively are recognised infrequently in horses. In a large referral population of horses, only 4/400 (1%) were diagnosed with mandibular brachygnathia[1]. Another source[2] reports an incidence of mandibular brachygnathia of 2-5%. This condition is suspected to have hereditary components although a recent genetic study conducted in Thoroughbred horses was unable to identify a specific locus in the horse genome to be associated with mandibular brachygnathia[3-4]. The condition can be present at birth but may also develop during growth in the first six months of life[5] and even spontaneously disappear over time[6]. Slight malocclusion of the incisor teeth is rarely a cause of clinical problems. Abnormal dental wear, difficulty apprehending food, different riding behaviour and aesthetical deficits influencing sales prices can result from severe incisor malocclusion which warrants corrective treatment despite the ethical questions raised by the possible hereditary nature of the pathology. Decisions regarding future breeding with these animals should be well discussed[2]. When detected early in life, correction can be achieved through means of temporary inhibiting growth of the 'overlong' jaw using a tension wire construction[5]. Alternative treatments include corrective osteotomy and subsequent fixation with Type 1 external skeletal fixation[7] or LCP plates[8-9], have been described. One case report describes the use of mandibular osteodistraction in a horse[10].

The purpose of this review is to describe the technique of growth inhibition using a tension wire construction with incorporated incisor bite plate and share experiences/complications/follow-up in a case-series of 20 foals treated at the equine clinic of the Faculty of Veterinary Medicine, Ghent University.

Surgical technique

Surgery is performed with the foal under general anaesthesia and positioned in dorsal (mandibular brachygnathia) or sternal (maxillary brachygnathia) recumbency. Prior to induction of anaesthesia, the mouth is copiously flushed with tap water to remove any remaining food particles. Intubation is preferred through the nose to maximize the limited available space in the oral cavity of these young animals. The mouth is preferably kept open with a full-mouth speculum.

The first step of the procedure is to pass a wire through the interdental space between the 07 and 08 cheek teeth. Using the 06-07 space to fit the wire is more easy but can result in progressive positional changes of the deciduous 06's in a mesial direction with subsequent tension loss on the wire construction. Originally, the authors passed the wire (stainless steel; 1.2 mm) through an opening made through the cheek adjacent to the interproximal space. A 5-6mm stab incision is made through the skin with a n°11 scalpel blade. Blunt dissection of the cheek muscles is done using Metzenbaum dissecting scissors until the cheek mucosa is reached. The mucosa is finally perforated with the blunt end of the closed scissors while creating counter pressure with the fingers from within the mouth. A 3.2 mm drill bit is used to drill a hole in the designated interproximal space. The use of a drill guide is not absolutely necessary as the tip of the drill bit will easily engage the alveolar bone. The hole is drilled approximately 3-5mm below the gingival margin to ensure firm anchorage of the wires in the alveolar bone. The direction of drilling should carefully follow the interproximal space and be parallel to the horizontal plane of the hard palate, and perpendicular to the long axis of the foal's head to avoid damage to the palatine artery and surrounding teeth respectively. The skin of the cheek incisions is closed with 2 staples or simple sutures of a resorbable suture material. Alternatively, an intra-oral approach can be used to drill the hole. For this purpose, a right-angled dental drill with 3mm drill bit is used. The hole is drilled from palatal/lingual to buccal under constant visual inspection with a dental scope. This technique is currently preferred by the authors because of its minimal invasiveness.

A 50-cm strand of wire is passed through the hole. When using the extra-oral approach (cheek incision), redirecting the lingual half of the wire to rostral is straight-forward. When using the intra-oral approach, the wire is passed through the mouth into the hole from palatal/lingual to buccal. Regardless of the approach used, retrieving the buccal half of the wire is done using a hook retractor or comparable instrument. This is also best performed under visual guidance of a dental scope to avoid damaging the buccal mucosa. Both wire halves are pulled tightly, crossed as they pass the interdental space and kept as close to the oral mucosa as possible. The palatal/lingual wire passes over the labial surface of the incisors, the buccal is directed to the lingual surface. Fixing the wires at the level of the incisors is done using the Obwegeser technique11. This technique uses wire loops to firmly attach the wires to the incisors. Tension on the construction is created by further twisting the wires at the level of the interdental space using a curved mosquito forceps. Any protruding cut ends of the wire are bent towards the labial surface of the teeth and protected with rubber tubes or dental composite if necessary to prevent damage to the lip mucosa.

Finally a bite plate is constructed to guide the longitudinal growth of the brachygnathic jaw. A 3mm thick fenestrated aluminum plate is cut to appropriate sizes to fit within the confines of the incisor part of the overlong jaw. Next, dental polymethylmethcrylate is applied to incorporate the aluminum plate, the adjacent wire construction and the incisors. Leaving the labial surface of the 01 elements exposed facilitates later evaluation of the degree of correction attained.

Postoperative administration of NSAID's helps in controlling any eating discomfort. Food can be adapted to short fiber sources. Long hay and straw fibers tend to accumulate around the twisted wires in the interdental space. The construction should be regularly checked for wire failure. Wires are removed as soon as complete correction is achieved.

Results

The medical records of foals admitted to the equine clinic of the Faculty of Veterinary Medicine, Ghent University between January 2008 and December 2018 were reviewed and 20 cases of brachygnathia were identified. The group comprised of 15 Warmbloods, 3 Quarters, 1 Arab and 1 Miniature horse. These last two were diagnosed with maxillary brachygnathia. All others presented mandibular brachygnathia. Female animals (14/20) were overrepresented in this group. Their mean age was 146,4 (± 50,5) days, ranging from 59 to 264 days. Mean occlusion difference between mandibular and maxillary teeth was 16,1mm (± 7,5mm) with a range of 3 to 25 mm. Wire failure during the treatment period was the most frequently recorded complication (9/20). Other complications included facial nerve paralysis (1) and development of a cheek abscess (1). The wire construction was removed after a mean period of 6,4 (± 3) days. At that time, perfect correction of the brachygnathia problem was only achieved in 8/20 foals. The advanced age of the animals and the absence of any expected further improvement was the main reason for removal of the construction in animals that failed to correct. More details and long-term follow up will be presented during the lecture.

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Is EOTRH more prevalent in the Icelandic breed compared to Warmblood horses?

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Introduction

Clinica[1], radiographical[2-3] and histopathological[4-5] features of equine odontoclastic tooth resorption and hypercementosis have been well described, demonstrating its progressive and destructive characteristics mainly affecting incisors and canines in the equine population. Clinical symptoms more often only appear in the later, advanced stages of the disease. No other solution than extraction of involved teeth is currently the treatment of choice[6]. Science has not yet been able to elucidate its etiopathogenesis although several hypothesis have been proposed. Prevalence of the disease increases with increasing age and male animals seem to be more affected than female. In most EOTRH studies Thoroughbreds and Warmbloods were overrepresented although a recent study showed also pony breeds to be susceptible for developing the disease[5]. Feedback from several veterinarians referring dental cases to one of the authors, led to the perception that the disease was more widespread in Icelandic horses compared to other horse breeds. The purpose of this epidemiologic study was to investigate the hypothesis that the prevalence of EOTRH in Icelandic horses is higher compared to Warmblood horses.

Material and methods

Several horse owners / riding schools were contacted for their cooperation in the epidemiologic study. No selection criteria except for traveling time were used for inclusion in the study. Recruitment stopped when two comparable (Icelandic horse, Warmblood) horse populations were examined. A clinical examination of the incisor and canine tooth region was performed by two trained persons (LV and EP) in the not sedated animal. Health information related to these teeth and their surrounding tissues was recorded on custom-made dental record sheets. Clinical symptoms associated with EOTRH included gingival hyperplasia or recession, fistulous tracts, bulbous enlargement of dental structures, tooth mobility and tooth fractures. The presence/absence of a combination of symptoms allowed determining the presumptive diagnosis of EOTRH. Farm management was recorded for each of the horses with respect to feeding and pasture turnout. Preliminary univariate statistical analysis of recorded data was performed in SPSS 25.0 with a significance level set at 0.5.