# Sternothyroideus Tenectomy Combination Surgery: Treatment Outcome in 95 Thoroughbred Racehorses (1996–2006)

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## ABSTRACT

This retrospective case series reports on the clinical experiences of a group of Thoroughbred racehorses in training that were treated surgically for intermittent dorsal displacement of the soft palate (DDSP) using sternothyroideus tenectomy in combination with soft palate surgery. The 95 horses included in the study were Thoroughbred racehorses in training referred for surgical treatment of intermittent DDSP over a 10-year period. Return to racing was 94% (89/95). Total earnings increased for up to three starts before and after surgery in 65% of horses (62/95, $P = .0006$). Of the 58 horses that raced in three or more races before and after surgery, 71% (41/58) improved their total earnings. Mean days to first start were 106 days. Performance index improved in 64% of these horses (37/58). Sixty of the 95 horses (63%) raced in six or more races after surgery. Sternothyroideus tenectomy combination surgery had a good prognosis for improving earnings and performance index after surgery in this group of horses that were treated for a working diagnosis of intermittent DDSP.

**Keywords:** Horse; Respiratory surgery; Dorsal displacement; Soft palate

## INTRODUCTION

Intermittent dorsal displacement of the soft palate (DDSP) is a common cause of poor performance in Thoroughbred racehorses.[1] The cause of the condition is not completely understood.[2] Diagnosis of this condition can be difficult and in a clinical setting is based on a combination of history, clinical signs, and endoscopic findings.

High-speed treadmill examination is the gold standard for diagnosis,[3] but this diagnostic tool is not always available in equine practice. Questions surrounding the cause and diagnosis of DDSP and the definitiveness of the diagnosis are well recognized, but with few controlled prospective studies of the naturally occurring disease in Thoroughbred racehorses, retrospective studies can still provide valuable information on the condition.

The numerous treatments and varied success rates described in the literature reflect the complexity of diagnosis and treatment, with no single consistently effective treatment for this condition in Thoroughbred racehorses. Reported surgical techniques include sternothyrohyoideus myectomy and staphylectomy, with reported 58%[1] and 59%[4] success rates, respectively. Sternothyroideus myotomy used in combination with staphylectomy was described in a group of 41 Standardbred horses and resulted in 70% improvement in race times.[5]

Sternothyrohyoideus myectomy has been performed in both standing and anesthetized horses anywhere from the larynx to the junction of the distal and middle thirds of the neck.[1] Reports vary as to the length of musculotendinous structure removed at the level of the larynx and range from a simple tenotomy or myotomy of the sternothyroideus muscle at its musculotendinous junction[5,6] to sternothyrohyoideus tenectomy or myectomy in which 8 to 10 cm tissue was removed.[7] A radical myectomy technique resecting a portion of the sternothyrohyoideus and omohyoideus at the junction of the proximal and mid thirds of the neck, removing 2.5 to 8 cm of each muscle at this level, led to 70% of horses increasing their earning per start.[8] Combination surgeries, using two or more techniques, infrequently achieve more than 60% improvement in performance. A combination of staphylectomy, ventriculectomy, and sternothyrohyoideus myectomy resulted in a 92% return to racing; however, performance assessed by race earnings was improved in only 60% of horses.[9] Staphylectomy, staphloplasty, and sternothyroideus myotomy, using a $CO_2$ laser,

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improved mean earnings in 63% of horses that raced at least once before and after surgery.[10]

Standing laser soft palate thermoplasty is reported as an alternative to staphylectomy after sternothyroideus tenectomy performed under general anesthesia.[11] Success was determined by return to racing and trainer satisfaction with performance. Based on those criteria, 80% success was achieved. In a study evaluating the usefulness of high-speed treadmill endoscopy for diagnosing DDSP, one or a combination of techniques of either epiglottic augmentation, staphylectomy, sternothyroideus tenectomy, or sternothyrohyoideus myectomy resulted in 64% of horses improving in average earnings.[3] Epiglottic augmentation in combination with sternothyrohyoid myectomy and staphylectomy in 59 cases (40 Thoroughbreds and 19 Standardbreds) resulted in improvement in racing performance in 73% of Thoroughbred racehorses and in 66% of the horses in the study overall.[12] Most recently, a laryngeal tie-forward procedure has been described experimentally[13] and clinically,[14] with improved earnings and performance index in 80% of horses after surgery.

There are difficulties in determining the success of a procedure even when using objective means, particularly when analyzing racehorse performance without reliable control populations, and difficulties with group comparability and randomization using clinical cases. Measures of success are not consistent throughout the literature, making direct comparison between studies difficult. Performance indices have since been developed using total earnings and earnings per start, changes in race class, place of finish, and race times. Studies using similar criteria for comparison of treatments make comparisons between techniques more relevant.

Using return to racing as an indicator of success, prognosis is excellent for combination techniques, with greater than 90%[8,9] success rates. Outcome does not appear as favorable when evaluated by the varying performance indices using improvement in earnings or class. Published retrospective studies on the most commonly used surgical treatments of DDSP using sternothyroid tenectomy report success rates ranging from 58% to 70%.[1,3-5,9,12-14]

The objective of our study was to provide a case series of a large population of Thoroughbred racehorses from one geographic area using a combination of techniques for DDSP. Establishing a baseline of existing techniques was thought to be particularly relevant when considering the adoption of a novel, potentially promising surgical technique.[14] We hypothesized that sternothyroideus tenectomy in combination with either staphylectomy or staphyloplasty had a better prognosis than that previously reported in the literature. Performance evaluation was carried out using previously reported criteria in a population of 95 Thoroughbred racehorses in training that were presented for surgical treatment of intermittent DDSP.

## MATERIALS AND METHODS

### Criteria for Case Selection

One hundred thirty-three Thoroughbred racehorses were referred for surgical treatment of DDSP over a 10-year period (November 1996 to November 2006). Thirty-eight horses were excluded for having concurrent upper respiratory conditions (18 for epiglottic entrapment, 3 for arytenoid chondritis, 5 for left laryngeal hemiplegia, 1 for epiglottic deformity) or musculoskeletal injury. Ninety-five horses were treated using sternothyroideus tenectomy, in combination with staphylectomy or soft palate thermoplasty. The 95 horses were in active race training at the time of diagnosis.

### Procedures

Information obtained from the medical records included history, signalment, preoperative upper respiratory tract endoscopy findings, surgical procedures performed, date of surgery, and postoperative care recommendations. Diagnosis of DDSP was based on history, clinical and endoscopic findings performed by one of three experienced equine veterinarians, and preoperative endoscopic findings of the surgeon. History of previous surgical treatments was not available. Most horses had undergone conservative management changes or medical treatment for a period without improvement of the presenting problem before referral for surgery. The soft palate and epiglottis were subjectively evaluated during resting endoscopy before surgery. Race results were retrieved using The Jockey Club Information Systems, Lexington, Kentucky. Outcome was determined by analysis of lifetime race records. Criteria evaluated from the race records were the number of preoperative and postoperative race starts, total earnings for up to three starts before and after the date of surgery, place of finish for three races before and after surgery, days to first start, and total number of starts after surgery. Minimum follow-up time was 9 months after surgery for inclusion in the study. Success of surgical intervention was defined as an increase in earnings per start in up to three races after surgery compared with before surgery.[3,4,6,9,10,14] A performance index (PI)[14] was calculated whereby a point value was assigned for place of finish ($1^{st}$ = 3 points, $2^{nd}$ = 2 points, and $3^{rd}$ = 1 point), and the PI was the sum of points earned in three races before and after surgery. To evaluate whether the presurgery earnings of the horse as a measure of ability or experience influenced earnings after surgery, records were also evaluated based on total earnings for at least one and up to three starts; group A $25,000+; group B $5,000 to 25,000; group C less than $5,000.[4] Horses with total earnings or PI after surgery of the same or of lesser value than before surgery were considered failures.