

## Research Article

# Anterior Belly of Digastric Transfer: New Treatment Modality for Adults with Congenital Hypoplasia of Depressor Anguli Oris

Ammad Rasul Ghumman,<sup>1</sup> Muhammad Saleem,<sup>2</sup> Omar Afzal,<sup>3</sup> Zain Ul Abidin,<sup>4</sup> Umar Asif,<sup>5</sup> Farrukh Aslam Khalid<sup>6</sup>

<sup>1-6</sup>Jinnah Burn and Reconstructive Centre, Lahore

### Abstract

**Background:** Among many causes of asymmetrical smile in newborns, congenital hypoplasia of the depressor anguli oris muscle (DAO) is among rare ones. This asymmetry may continue to adulthood, as many patients may present with varying degree of smile animation discrepancies.

**Objective:** to show the efficiency of ant belly of digastric transfer for reanimation of lower lip in congenital depressor angulioris hypoplasia

**Methodology:** This case series comprises of 05 patients with congenital hypoplasia of depressor anguli oris muscle. These patients were not associated with other syndromes, congenital anomalies or paralysis of other branches of facial nerve. All were operated with the anterior belly of digastric muscle transfer (ABDMT).

**Results:** After mean follow up of 12 months, satisfactory outcomes were accomplished in all patients with all exhibiting improved symmetry during full mouth opening.

**Conclusions:** ABDMT proved to be most reliable method for restoration of depressor function which lead to excellent aesthetic and functional animation of lower face.

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**Corresponding Author** | Dr. Ammad Rasul Ghumman, Jinnah Burn and Reconstructive Centre, Lahore.

**E-mail:** ammad522@hotmail.com

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### Introduction

Incidence rate of congenital hypoplasia of depressor anguli oris (DAO) is 0.2%-0.6%, and affected patients are characterized by drooping of mouth corner at contralateral intact side while crying or mouth opening.<sup>1-2</sup> Affected individual's pathogenesis was first described by Parmalee as congenital unilateral hypoplasia of depressor anguli oris.<sup>3</sup> Later on, Cayler<sup>4</sup> presented five cases of congenital unilateral lip paresis associated with cardiac anomalies, which lead to extensive investigation criteria before undertaking any treatment modality. Most of the time diagnosis is done in clinical observation and proves to be the first step toward diagnosis and later on electromyography studies (EMG) provides confirmation, showing decreased motor unit potentials further confirming myogenic nature of deformity.<sup>5</sup> Congenital hypoplasia of DAO muscle can present as isolated ano-

maly without involvement of other systems but this can also be part of wide spectrum of abnormalities involving musculoskeletal, genitourinary and central nervous systems further complicating the situation.<sup>3,6-10</sup> Multiple methods for reanimation of lip are described, from balancing the asymmetry by selective mandibular neurectomy or myotomy of unaffected side to numerous static and dynamic means to reanimate the affected lip side.

Digastric muscle is a small paired muscle located in the anterior triangle of neck just under the platysma muscle. It comprises of two bellies with separate innervation and blood supply and attach to each other with an intermediate fibrous tendon, making it ideal for such transfer.

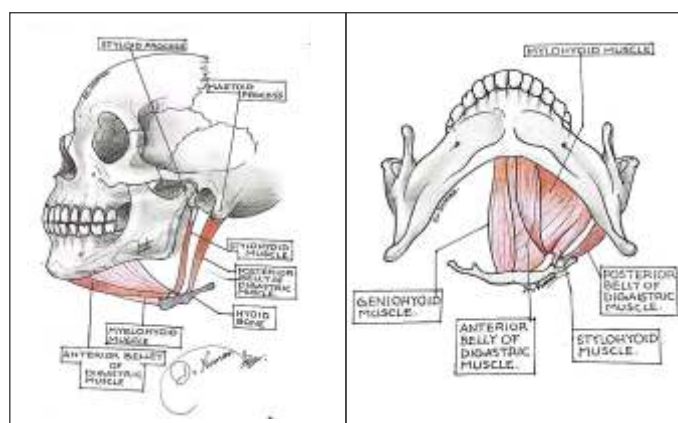
As shown in figure 1, Anterior belly originates from digastric fossa of mandible, innervated by mylohyoid nerve (branch of inferior alveolar nerve) and blood

supply is provided by submental branch of facial artery.<sup>11</sup> Posterior belly arises from mastoid notch of temporal bone, innervated by digastric branch of facial nerve and nutrient artery is supplied by lingual artery, branch of ext.carotid.<sup>11</sup> Both bellies are connected by intermediate tendon which itself encircled by the U-shaped fibrous sling on the superior border of hyoid bone. (Figure 1) Digastric provides two functions: depression of mandible when hyoid is fixed and elevation of hyoid bone and larynx when mandible is fixed.

In this study, we used anterior belly of digastric muscle to reanimate the lower lip. All patients had congenital hypoplasia of DAO.

### Methodology

Total of 05 patients were included from outdoor department with complaint of facial asymmetry while smiling and mouth closing. All individuals were thoroughly examined and investigated for other associated anomalies and paresis of other branches of facial nerve.



**Figure 1:** Digastric muscle anatomy

**Operative technique.** After marking (Figure 2) and infiltration of local anesthetic, incision was placed just above hyoid bone. After raising the flaps in subplatysmal plane, adequate exposure was made by fixing the flaps. After careful dissection, intermediate tendon was identified which is attached to hyoid bone. The U-shaped fibrous sling is released to mobilize. Then muscle was released by taking part of posterior belly. Flap was carefully released from mylohyoid muscle. Care was taken to preserve neurovascular bundle which enters the flap from superomedial side. After completing flap elevation, recipient site is approached. After marking, local anesthetic with adrenaline infiltration was done. A small incision (app 2-2.5cm) given at vermilion border 1-2 cm medial to oral commissure, as shown in Figure 3.

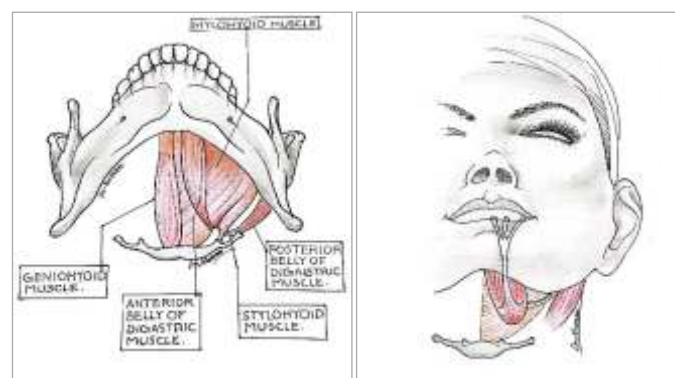


**Figure 2:** Pre-operative marking



**Figure 3:** Intraoperatively showing anterior belly of digastric muscle and incision over vermilion border for transfer.

The muscle was mobilized & tunneled toward lip incision. The muscle part of post belly was spilt into 3 slings and sutured in three positions: lateral slip to oral commissure, medial slip to orbicularis oris muscle remaining middle slip just between medial and lateral slips as shown in Figure 4. The tension of repair was adjusted carefully so that lip margin began to move from resting position. A careful balance must be acquired between under and over correction as any such error can lead to unacceptable animation.



**Figure 4:-** Muscle mobilization and insertion.

Patients were followed up for 12 months at which time,

assessment of smile symmetry was done. A panel of 4 hospital staff was made. Members of panel were not familiar with details of surgery. Each person is assigned with a result sheet as shown in table 1, to score the improvement in patient. They were provided with pre- and post-operative photographs of patient in smiling and neutral position for determining the improvement and functional outcome.

**Table 1:** score card for improvement in smile

Score	Interpretation
0	No improvement
1	Improvement in smiling posture with lip close
2	Improvement in smiling posture with lips separate
3	Improvement in both smiling and crying pose

## Results

Total number of patients was 5. There were 4 males and 1 female. The mean age of presentation was 22 years. Mean score of the sample was 2.2 based on the provided score card, yielding excellent results. This shows the efficiency of using anterior belly of digastric muscle in providing excellent animation in hypoplastic DAO muscle. Figure 5



**Figure 5:** (a) pre-op and (b) 8th month follow-up after anterior belly of digastric transfer showing excellent symmetry

## Discussion

Congenital hypoplasia of DAO presents in early age as facial asymmetry which is more evident while smiling and eating, later on in adult life patient usually present with complaints of inability to close mouth and lopsidedness of affected side.<sup>8</sup> Care must be taken as this deformity could be associated with other congenital abnormalities. Cayler termed them as craniofacial syndrome in which wide array of congenital deformities are present

from congenital cardiac defects to skeletal abnormalities.<sup>4</sup> It is also advised for such patients to undergo chromosomal analysis for screening of 22q11.2 microdeletion as incidence of this genetic abnormality is very high in such individuals as compared to general population.<sup>15</sup>

In adult age, congenital hypoplasia of anguli oris can be isolated finding but its diagnosis should lead to multi-disciplinary team approach to investigate to exclude other congenital abnormalities. As incidence of associated major malformations in neonates is almost 10%, so neonates present with other complains in very early period.<sup>12</sup>

According to Lahet et al, the exact cause of congenital DAO hypoplasia is unknown. But there are multiple hypothesis from viral infection to intrauterine alteration. In another study conducted by Papadatos, in which 37 patients were followed back multiple generations and found affected ancestors among half of them, which lead to conclusions of strong autosomal dominant trait.<sup>14</sup>

There are conflicting studies regarding predominant side, some suggest right side<sup>14,13</sup> while in other authors reported dominance towards left side.<sup>14</sup> Out of our 5 patients, 4 presented with complain of facial asymmetry on left side while only one presented with right side.

There are multiple procedures advocated in past for this deformity. Yavuzer and Jackson<sup>16</sup> did a wedge excision from the hypoplastic side and defect is closed by advancing the muscle to the commissure creating a dynamic lip. In a study comprising of 74 patients, dynamic depressor muscle was created with platysmal transfer, direct neurotization etc.<sup>17</sup> Edgerton was the first one who used digastric muscle belly transfer in such cases. He used fascia lata slings, with one end attached to digastric muscle belly while other end is divided in two parts: one attached to commissure and other one just lateral to midline, and maintained tension in slightly overcorrection manner. This created a bidirectional pull but used tensor fascia lata slings.

Digastric transfer is a simple but effective way to give animation to lower lip. The digastric muscle is in close proximity to affected area and it can be sacrificed without any long-lasting effects. In our cases, we created three slings and sutured them to three points as we believe it creates more natural and strong animation. Secondly muscle is directly divided and mobilized so use of any fascial sling unnecessary, leading to decrease operative time and early hospital discharge. As results also indicate, a better dynamic lower lip animation can be achieved with this technique.



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**Ammad Radul Ghuman:** Article writing, contribution to the acquisition of data,

**Muhammad Saleem:** Idea and data collection

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