CASE STUDY

Modified Type IV Thyroplasty (Cricothyroid Approximation) in a Patient With Androponia

Tiroplastia tipo IV modificada (aproximación cricotiroidea) en un paciente con androponía

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Clinical Case

We present the case of a 22-year-old female patient who had observed that for the last 5 years her voice had a characteristically masculine low pitch. She was examined by the Endocrinology Department which ruled out any hormonal pathologies. She was referred to the Laryngology Department for diagnosis and treatment, with consideration of the psychosocial impact of an androgynous pitch in a young woman.

Laryngeal stroboscope and nasofibrolaryngoscopy tests were conducted, with no evidence of organic impairment in either the aerodigestive tract or in the morphology of the larynx. We decided to carry out an acoustic analysis of the voice and a subjective assessment of vocal incapacity index (VHI-10) and also a quality of life study validated in Spain, prior to any surgical intervention.

It was suggested to the patient that she undergo a type IV (cricothyroid approximation) thyroplasty surgery to increase the voice pitch and obtain a voice with feminine characteristics in keeping with her gender. The patient accepted the surgical intervention with prior informed consent regarding risks and complications.

The procedure was performed under general anaesthesia, with cervical extension facilitated by a raised back. Repair suture marcation: lower edge of cricoids cartilage and lower edge of thyroid cartilage, injection with xylocaine with 2% epinephrine. 5 cm cervical incision in the middle of the marked repair sutures, raising of upper and lower platysma flaps, identification of strap musculature and mid-line incision for exposure of thyroid and cricoids cartilage. The left and right thyroid plate were marked at 1 cm from the lower edge of the thyroid glands for suturing. Unlike the original technique recorded by Ishikki1 where 4 sutures are used for cricothyroid approximation, we decided to modify this using 2 stitches with number 2 plaited non absorbable nylon sutures in addition to silicone plates to accurately secure the knots without damaging the thyroid cartilage. The first stitch was inserted at the thyroid level, which then surrounded the cricoids cartilage along its lower edge to then return to the thyroid cartilage and a stitch on each side was added for the greatest possible approximation (Fig. 1A). Finally tension

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was secured between both sutures and they were knotted with the protection of the silicone plate to obtain the best possible tension without damaging the cartilage (Fig. 1B). The incisions were closed following prior insertion of drainage.

Post-operative patient follow-up check-ups took place after two months and six months. Acoustic analysis of the voice was made, VIH-10 and quality of life index at two and six months (Table 1). The patient received phonological support therapy up until the fifth postoperative month, with a slight increase in fundamental frequency for the six-month postoperative follow-up. The patient showed major improvement in voice tone, obtaining a tone with feminine characteristics and a final gain of mean fundamental frequency of 75 Hz (mFo) in a comfortable speaking voice. With regards to the VHI-10 parameters and the quality of life index, a major improvement was observed in vocal incapacity. After six months the patient reported an absence of vocal incapacity and an improved quality of life from the procedure. The acoustic parameters assessed recorded a major improvement in fundamental frequency, with ranges below the normal ones for feminine voices, with Jitter and Shimmer without any significant changes in the postoperative period and a smooth phonation index (SPI) which showed greater glottis stability and lower tensional voice patterns. Nine months after surgery the patient reported no changes to her voice and was satisfied with the outcome.

Discussion

The role of the voice in sexual identity, in social behaviour and interaction with other individuals is of utmost importance. The female voice has several special characteristics, its tone is one of the aspects which characterise it. However, this is not the most distinctive aspect for defining a female voice. Parameters such as intensity, speed, resonance and paraphrasing must be taken into consideration in order to define a female voice. The tone expressed in Hertz (Hz) or fundamental female frequency ranges between 196 and 224 Hz, but it has been demonstrated that voices with female tones may be considered masculine and vice versa, as demonstrated by Van Borsel et al. This probably occurs because factors such as culture, language and even physical appearance are vital in the creation of vocal identity.

Androphonia is defined as the masculinisation of a female voice. In the case we present the androphonia was constitutional in type, with no hormonal anomaly. Surgical techniques for feminisation of the voice aims at increasing fundamental frequency mainly modifying: tension, mass or length of vocal. Many techniques have been
reported and popularised in the last decade, especially in the transsexual population who wished to feminise their voice. The IV type thyroplasty described in 1983 by Ishi kii, also called cricothyroid approximation, attempted to imitate the action of the cricothyroid muscle and thus obtain greater tension in the vocal cords. The series of cases in transgender patients has proven to be of benefit and gain may range between 0 and 113 Hz. There are very few reports of cases using this technique in female patients with androp honia due to the low prevalence of androphonia in the female population. Gibbins et al. reported the use of the type IV thyroplasty technique in a patient with an upper bilateral laryngeal nerve injury with the performance of total thyroidectomy. The technique aimed at emulating the cricothyroid muscle and the findings positively supported this technique for selected cases. Several authors such as Kocak et al. reported on the use of type IV thyroplasty in patients with androp honia with variable results which have required the performing of other techniques such as laser reduction glottoplasty for a better outcome. This shows that type IV thyroplasty or cricothyroid approximation may be used as an initial approach in patients with androp honia. With regards to surgical indications and patient selection, the individual situation of each patient must be examined and the following circumstances should be taken into account: patient occupation, psychosocial impact of androp honia and personal desire. Given that the outcome of this surgical technique may be suboptimum, surgical interventions such as laser glottoplasty or Wendler glottoplasty may be selected, for a more satisfactory outcome. The use of the silicone plate and use of 2 symmetrical tension sutures

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Preoperative</th>
<th>Postoperative second month</th>
<th>Postoperative sixth month</th>
<th>Normal gender values</th>
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<tr>
<td>Vocal incapacity index (VIH-10)</td>
<td>27</td>
<td>8</td>
<td>7</td>
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<td>Quality of life index (QLI)</td>
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<td>3</td>
<td>-</td>
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<td>Middle fundamental frequency (mFo)Hz</td>
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<td>High fundamental frequency (Fhi)Hz</td>
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<td>Soft phonation index (SPI)</td>
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Conflict of Interests

The authors have no conflict of interests to declare.

References