Use of botulinum toxin in cheiloplasty: A new method to decrease tension

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OBJECTIVE: To determine if the use of botulinum toxin during cheiloplasty could help in the management of tension at the surgical wound level.

INTERVENTIONS: Five children younger than six months of age, who were born with complete cleft lip and palate, were treated with a dose of 10 units of botulinum toxin injected into the upper lip during surgery. Before the surgery, an electromyographic study was carried out on the patients' upper lips. A Millard-type cheiloplasty was performed and 10 days later, a second electromyographic study was performed on the upper lips of all the patients.

RESULTS: There was a significant change ($P < 0.039$) in the electromyographic tracing obtained after the application of botulinum toxin, especially during rest.

CONCLUSION: As confirmed by electromyography, botulinum toxin effectively inhibits the action of the orbicularis oris muscle, especially when at rest; consequently, the tension is decreased at the level of the surgical wound.

Key Words: *Botulinum toxin; Cheiloplasty; Cleft lip*

Cleft lip and palate repair is considered an important cause of distortions in facial growth as well as inhibition in the development of midfacial region in some patients. Hagerty and Hill (1) discovered that a very tense cheiloplasty can cause collapse of the maxillary arch with resulting deformities in lip contour. Bardach and Kelly (2) have suggested that healing, as an outcome of the excessive lifting of the soft tissues during cheiloplasty, provokes alterations in facial development. It has been demonstrated that cleft lip patients who have undergone cheiloplasty often show a considerable inhibition in the sagittal development of the midfacial region, after total growth (3). It is also known that the healing process is affected when there is tension at the wound level.

To assess the importance of the lip function in the morphology of the midfacial region and the maxillary arch, Göz et al (4) used bipolar surface electrodes to measure the activity of the upper and lower lips at rest and when pouting, in patients who had undergone cheiloplasty. They reported an unsatisfactory lip function that was characterized as an increase in the activity of the upper lip when at rest.

Bardach and Kelly (2) showed an important increase of pressure on the upper lip in children with complete cleft lip after the repair, compared with the control group, at two years of age.

A study by Bardach et al (5) showed that in rabbits, the relation among lip pressure, electromyographic activity of the orbicularis oris and the growth of the middle area of the face

L'utilisation de la toxine botulique en chéiloplastie : Une nouvelle méthode pour réduire la tension

OBJECTIF : Déterminer si l'utilisation de la toxine botulique en chéiloplastie peut contribuer à la prise en charge de la tension de la plaie chirurgicale.

INTERVENTIONS : Cinq enfants de moins de six mois, nés avec une fente palatine et un bec-de-lièvre complets, ont reçu une dose de dix unités de toxine botulique injectées dans la lèvre supérieure pendant l'opération. Avant l'opération, on a effectué une étude électromyographique de la lèvre supérieure de ces patients. On a procédé à une chéiloplastie de type Miller et, dix jours plus tard, à une seconde étude électromyographique de la lèvre supérieure de chaque patient.

RÉSULTATS : On a remarqué un changement important ($P < 0,039$) dans le tracé électromyographique obtenu après l'utilisation de la toxine botulique, notamment au repos.

CONCLUSION : Comme l'a confirmé l'électromyographie, la toxine botulique inhibe avec efficacité l'action du muscle orbiculaire de la bouche, surtout au repos. Par conséquent, la tension est réduite dans la région de la plaie chirurgicale.

can be pharmacologically manipulated using papaverine. He determined that the middle facial development and the healing were improved with this modality. Bardach et al (5,6) also showed that by decreasing high postoperative pressure and hypertonicity of the lips, a more favourable middle face development was achieved.

Based on these criteria, I carried out a clinical study at the University of Guadalajara, Mexico, to determine if the use of botulinum toxin during a cheiloplasty could help in the management of tension at the surgical wound level, with consequent better development of the midfacial region. The results were first reported in my graduation thesis.

METHODS

The study was based on a group of five children younger than six months of age, who were born with complete cleft lip and palate. The study was approved by the Board of Instituto Jalisciense de Cirugía Reconstructiva "Dr. José Guerrerosantos", a hospital affiliated with the University of Guadalajara, Mexico.

Before the surgery, an electromyographic study was carried out to the patients' upper lips (Amplaid Electromiografo, Model MK 12, Italy).

The children were treated with a dose of 10 units of botulinum toxin injected during the surgery. The dose was distributed as follows: three units in the medial portion of orbicularis muscle and two units in the lateral portion of the same muscle,

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in each cleft lip. A Millard-type cheiloplasty was performed and 10 days later, a second electromyogram was performed on the upper lips of all the patients.

RESULTS

There were no complications due to the injection of botulinum toxin. There was a significant ($P < 0.039$) change in the electromyographic tracing obtained after the application of botulinum toxin, especially during rest. This suggests that there was an effective decrease in the orbicularis activity of the lips. During activity, the tracing did not show a significant difference ($P > 0.214$); this occurred because the activity of the upper lip was influenced by the perioral muscles that produced traction and did not receive botulinum toxin. There were no early dehiscences of the surgical wounds.

DISCUSSION

When this study was presented at the XXIX Annual International Symposium of Plastic-Aesthetic Surgery, there was no other published study on the use of botulinum toxin on patients with cleft lip and palate (7).

The results of the study suggest that the intraoperative injection of the botulinum toxin decreases the activity of the orbicularis oris muscle in children suffering of cleft lip and palate. Its use is clinically safe.

Botulinum toxin has already been used in patients with different pathologies, in higher doses, without showing any adverse effects; however, it has not often been used in children, especially in the facial region (8).

I considered the intraoperative administration appropriate instead of injecting it preoperatively, because the children frequently suffered upper respiratory tract infections that often delayed the surgeries. The electromyography was always performed 10 days after the surgery so the effects of the toxin were completely active.

Follow-up electromyographic studies of children with cleft lip have been carried out postsurgery and when they were swallowing saliva; it was determined that when these patients swallowed, they put a considerable amount of pressure on the maxillary arch (9).

In the present study, comparing the electromyographic tracings before the surgery with the ones obtained after showed a considerable decrease in the muscular activity, especially during rest. Taking into account these findings, it is evident that a broad field of research related to the use of botulinum toxin in this type of patients has been opened. For example, in the cases of severely wide or bilateral clefts, or when the nutritional conditions are not appropriate, botulinum toxin may have an added utility.

Among others, these are some questions that seem pertinent:

- With the use of botulinum toxin, would it be necessary the previous lip adhesion?
- Would the botulinum toxin use allow a better development of the midfacial region in these children?
- Would the use of botulinum toxin be useful in palate surgery?

Tollefson et al (10) reported the use of botulinum toxin in a group of three children to obtain a chemoimmobilization days before performing a cheiloplasty.

This ratifies what was shown in the present study, carried out in 2002 at the Instituto Jalisciense de Cirugía Reconstructiva "Dr. José Guerrerosantos", affiliated with the University of Guadalajara, Mexico, that the use of botulinum toxin is safe for the preoperative treatment of cleft lip patients.

CONCLUSIONS

Botulinum toxin is useful and safe for treating patients with complete unilateral cleft lip, who are younger than six months of age. Botulinum toxin effectively inhibits the action of the orbicularis oris muscle, especially when at rest, as it has been electromyographically proved; consequently, the tension decreases at the level of the surgical wound.

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