The clinical aspects of using an upper face mapping system for administration of BOTOX®

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Here we present the authoring system of mapping of the upper third of the face designed to achieve more accurate and predictable result when using BOTOX®. The efficacy of this method is based on individual anatomical and functional peculiarities of the patient's face allowing the physician to ensure the safest and the most effective correction.

The mapping basically presumes some unification, however, when developing our mapping system, we took into account not only fixed anatomical landmarks (in their entire variability), but also the dynamic changes when applying functional mimic tests as well.

For illustration purposes, the facial mapping system is presented in two forms. The first, the safest and the most effective correction are shown in green, additional points (area) - in yellow, the areas where injections should not be performed - in red.

A. Horizontal sectoring

The degree of relaxation of the frontalis muscle determines the position and shape of the brows. In male patients, the horizontal sectoring A should be injected to the frontalis muscle at the level C, 2-2.5 cm upwards the edge of the bony orbit or 1.5-1.7 cm upwards the line C. By considering the points of injections to form one horizontal line and considering the dose of 3-4 Units of the product per each point, the choice of the level of administration regimen and total dose (15 Units) of injections into the frontalis muscle made as described above allows to achieve optimal aesthetic result.

When performing these injections in female patients, the problem is to reach the wrinkles of the forehead and to lift the eyebrows forming more open gaze. In this case, the points of administration of BTA into the frontalis muscle should be located 2.5-3 cm above the line C. The dose per each injection point is lower than in males and equals to 0.25 Units.

The chart of the horizontal sectoring of the upper third of the face.

Level B - red zone in our “traffic lights”, as Botox® injections to this area are not advisable. The level B is located 1.5 cm upwards the upper edge of the bony orbit. In practice, the width of the level B depends on the activity of the fibers of the lower portion of the frontalis muscle and may be 2-3 mm in total.

The line L is drawn through the lower point of the aponeurosis of the frontalis muscle. This level corresponds to the working part of the frontalis muscle. Its width depends on the height of the forehead and may vary from 2 to 5-7 cm.

Botox® injections at this level allow to individualize the procedure of botulinum toxin therapy depending on unique peculiarities of patients. Anatomical and functional characteristics of the frontalis muscle, the patient’s gender, age and volume of the skin in the patient’s face. Both green and yellow zones of the “traffic lights” are located at this level, and the efficacy of performing injections into these areas is determined by the physician. The dose of botulinum toxin type A (BTA) is also selected on an individual basis.

Vertical sectoring of the upper third of the face allows to change the chart of location of the injection points corresponding to the shape and size of the eyebrows. Selection of the level, administration regimen and total dose (15 Units) of injections into the frontalis muscle made as described above allows to achieve optimal aesthetic result.

The level C is located between the lines B and C. Remember that the line C corresponds to the lower edge of the contracted frontalis muscle on the forehead. Anatomically, this line passes in the area of the contact between the orbital portion of m. orbicularis oculi and the skin, in which is firmed by the aponeurosis of m. orbicularis oculi. This line is typical for females. Botox® injections into this area are not advisable. The line C is located 1.5 cm upwards the upper edge of the bony orbit.

Irregularly, the width of the level C is located 1.5 cm upwards the upper edge of the bony orbit. In practice, the width of the level C depends on the activity of the fibers of the lower portion of the frontalis muscle and may be 2-3 mm in total.

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B. Correction of the position of the head of the eyebrow (manipulations in the segment 3)

The segment 3 is the key zone for making a decision regarding the position of the head of the eyebrow. This is where the head of m. corrugator supercilii and the area of its bone fixation, m. procerus supercilii, upper-medial and lateral portions of m. procerus are located being the group of depressors of the chromatic chain. The medial fibers of m. frontalis form the levator group. In order to lift the head of the eyebrow in this segment, BTA injections should be performed to the m. corrugator supercilii at the recommended dose of 0.5 Botox® Units or less (at the expense of denervation of m. procerus - see the description of manipulations in the sector 1).

In case of low forehead, the product is not injected into the line L, m. frontalis, or is injected into the point located at the line L close to the line D. The dose of the product in this case should be equal to minimum recommended dose - 2 Units per point on each side.

C. Correction of the shape of the eyebrow

The segment 2 is an area of the muscle complex. Basis for the segmental work in this area is the anatomy of the protractor and levator muscles of the eyebrow. The area is determined by the physician. The dose of botulinum toxin type A (BTA) is also selected on an individual basis.

D. Lifting of the tail of the eyebrow (manipulations in the segment 4)

The segment 4 includes the upper-lateral portion of m. orbicularis oculi and lateral fibers of the frontalis muscle. Botulinum injection therapy in this segment is especially successful. Chart of location of injection points for lifting of the tail of the eyebrow in females

The objective of the lifting of the middle third of the eyebrow is typical for females. Botox® injections to the segment 3 allow to change its shape. Successful work with the muscle in this segment allows to make the eyebrow more flat, straight or arched, with elevation of the inner and outer canthi.

At the level of the segment 3, there is an area of injection of the tail of m. corrugator supercilii.

In order to preserve the position and shape of the eye brow, which is conceptually important when working with males, denervation of the tail of m. corrugator supercilii should be performed by injecting the standard recommended dose of Botox® (0.5 Units or less) at the expense of results in uptake by the nerve receptors m.orbicularis oculi, leading to its relaxation. It is also obligatory to administer BTA into m. frontalis at the level C, and the localization of the injection point depends on the height of the forehead and may be close to the line C or located in the middle between the lines C and D.

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The mapping is adapted to the specific patient and allows to perform correction using BTA® as indicated in official guideline but taking into account individual peculiarities and preferences.

5. CONCLUSION

The suggested mapping system of the upper third of the face, which includes vertical and horizontal sectoring, allows to allocate the areas of performing effective and safe injections and the areas of performing additional injections, as well as to avoid the areas where Botox® injections are not advisable. The mapping system developed is successfully used in practice.

So detailed protocol will allow to analyze the result in the future and change the chart of location of the injection points or clarify its dose, if necessary.

D. Clinical case example

Below we present an example of using of the suggested mapping from our clinical practice

Table 1. Table for introduction of Botox® doses used for correction of the upper third of the face into outpatient medical record

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<table>
<thead>
<tr>
<th>Segment 2</th>
<th>Segment 3</th>
<th>Segment 4</th>
</tr>
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<tbody>
<tr>
<td>1 Unit</td>
<td>1-2 Units</td>
<td>3-4 Units</td>
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References