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Cranio-facial and plastic surgery in the work of Girolamo Fabrici D'Acquapendente (1533-1619)

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Summary: Girolamo Fabrici D'Acquapendente (1533-1619) was one of the most famous representatives of Padua Medical School, while at the same time a skilled surgeon, a highly-considered anatomist, an eclectic individual, builder of surgical and orthopaedic instruments, and a firm believer in the importance of anatomical knowledge for surgeons. In the 16th century Padua was the principle town of the Venice Republic outside of Venice, because of its well-deserved fame for political, religious and intellectual freedom, and because its University was attracting students from all over Europe. Fabrici in his almost 50 years of teaching, educated entire generations of future physicians, including William Harvey. Fabrici started to publish frequent anatomic observations and surgical experiences only in 1600 when he was almost 70 years old, and after a 30-year career. A particularly important work of his, is the large anatomical Atlas: Totius animalis fabricae theatrum, unfortunately unpublished. Today in the National Marciana Library in Venice there are more than 200 figures from the monumental text which have been reproduced in colour and in the natural size of the anatomy of man and of the most important animals. Several of the large images are a true iconographic asset of Fabrici's printed work. This paper aims at presenting the technical surgical descriptions of the cranio-facial district Fabrici had learned from the classic Greek and Roman physicians or had invented, critically analysed and divulged in the academic world of the 17th century.

Key words: History of Medicine; Plastic surgery; Maxillofacial surgery.

Girolamo Fabrici d'Acquapendente (1533-1619), one of the most famous representatives of the illustrious Padua Medical School was, at the same time, a skillful surgeon, an appreciated anatomist and an eclectic who devised new surgical and orthopedic instruments and advocated the importance of anatomical knowledge for surgeons.

In the 16th century Padua was the principle town of the Venice Republic on dry land and, due to its well deserved reputation of political, religious and intellectual freedom, its University attracted students from all over Europe. In that period two "laboratories" were founded in Padua: the *Hortus Simplicium*, one of the most ancient botanical gardens of the modern age, and the *anatomical theatre*. The first one was used to cultivate medicinal plants and the second to surgically train medical students. In the same years there was an important change: Andrea Vesalio, Fabrici's predecessor, was the first professor of anatomy who personally performed autopsies instead of limiting himself to directing from above someone with no specific medical training, such as "barbers", "dissectors" or "surgeons". The fact of teaching anatomy *in situ* prompted rapid development and an equally rapid development of new surgical techniques.

Among his contemporaries, Fabrici was famous both as an anatomist and a surgeon, and during almost 50 years of teaching educated entire generations of future physicians. One of them was William Harvey, who discovered blood circulation, and among his patients an illustrious one was Galileo Galilei.

Fabrici started to publish his numerous anatomical observations and equally numerous surgical experiments only in 1600, when he was nearly 70 years old and had been active for about 30 years. A particularly important aspect of his production was a large anatomical Atlas (*Totius animalis fabricae theatrum*) which unfortunately remained unpublished. From that monumental work representing the life size anatomy of man and many animals, in color (a first known

with temporal muscles strained and contracted. To put the jaw back into position, movements opposite to those which led to the dislocation must be performed; the jaw should therefore be pushed down, behind and then up. To do that, both thumbs have to be introduced into the mouth, two fingers put outside on the chin and then the jaw pulled down, behind and up. To decrease inflammation put rose plasters and clothes soaked with egg white on the temples; a dressing is then prepared to wrap the chin and head in order to block any mouth opening; the dressing should be maintained two to three days; a liquid diet should be followed.

How to pierce the skull: Draw a line from the middle of the ear to the opposite one and a line from the nostrils to the top of the head. Carve with a chisel (lancet) and stop the bleeding with red-hot iron bars to reach the bone. Another technique to find the *repere* is to put the carp on the nose tip, extend the hand above the nose, the forehead and the head and, where the median finger tip touches, that is the meeting point of the co-mixures, i.e. the place where the hole should be made. The *repere* changes both on the basis of shape of the patient's head and hand size. For that reason choose the top of the head, the joining point of sagittal and coronal co-mixures. Two types of instruments may be used: the potentially burning ones (abrasives) blistering and the actually burning ones hot-red iron bars one hollow and toothed and then another hollow only, with no tooth and less traumatizing.

Use of the drill: The hole in the skull is made once the pericranium has been removed to avoid inflammation and pain. The drill is placed with its shanks on the edges of the wound on linen clothes which are dry or sprinkled with red wine to avoid harming the tissues; the rotating drill tip is moistened and lubricated with rose oil or rose water to prevent excessive heating. This way of piercing the skull with the drill is very safe since it allows one to appreciate when all the bone is pierced and avoids harming the membrane below.

– *Chisel*: The chisel can be used in skull cracks and clefts and it can be wide or narrow; the wider one is used first. Once the skull has been pierced, if there is a chip or any irregularity in the bottom of the hole which can spoil the membrane, they are regularized with a chisel bearing at its end a rounded off lens-shaped part and hence called lenticular to touch and protect the membrane. When the drill touches the *dura mater* use a copper and not iron blade because being cold the latter can harm the *dura mater.*

– *Sty:* A sty is a small swelling similar to a grain of barley; it encloses an unripened substance so warm bread or warmed wax is placed on it to help ripening and then it is cut with a small knife or a lancet and squeezed to drain the contents.

– *Relaxed eyelids:* Sometimes the skin of the upper eyelid is so relaxed that it doubles and covers the eye causing the eyelashes to turn inside and hurt the eye. According to Celsus (book VII, ch. VII) in such cases the excessive skin should be removed and the amount to be cut away is determined by raising the skin and marking with ink two lines to define the excess, so that the eyelid can revert back to normal. The excessive skin is removed with a small sickled knife starting from the lateral region and going toward the nasal region. The two carved lines are then joined with simple stitches. The operation, besides being difficult, is dreadful and very cruel, therefore it must be DISCARDED! It should instead be replaced by putting some glue on the eyelids with some small laces, two on the forehead and on the eyebrow and when the upper ones bond with the lower ones the eye stays open; the effect of the astringent glue causes the eyelid to contract so the eye remains open.

– *Lagophthalmus:* When the upper eyelid does not cover the eye, often following a burn. Celsus, to cover the eye, made an U-shaped carving on the upper eyelid up to beyond the orbicular muscle. This is a heavy operation that may cause the eyelashes to harm the eye; consequently some glue should instead be applied to the upper eyelid with two to three hanging laces and another lace with glue should be put on the cheek. The laces are then tied together so that the upper eyelid covers the eye. Since this operation is truly minimal it is very easy and safe. As for the glue, it can be prepared with different substances but all "tenacious and astringent" such as incense powder, ragia, mastix, Armenian bolus, Farco glue and to avoid getting wet by secretions they should be mixed with colophony or pitch; the "dusty" products must be applied together with egg white.

– *Ectropion*: When the lower eyelid does not shut. Also in this case it is customary to put

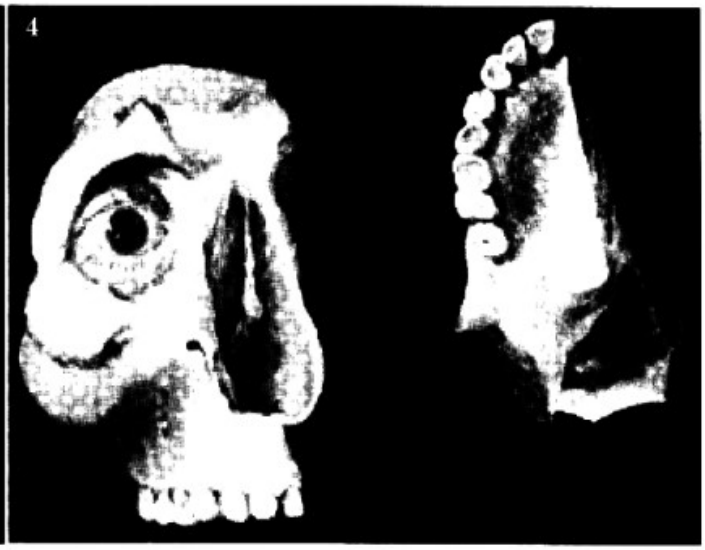

Figure 3. - *Palate*. Infection or cancer to remove the illness use a pincer, a sharp silver coin or hot irons.
Figure 4. Anatomical section of the face and of the palate.
Figure 5. - A split mandible and tongue.
To split the bone a chisel and hot irons were used.

some glue on the lower eyelid and on the forehead with glued laces tied up to cover the eye for an adequate period of time. Mallow and chamomille decoctions may be useful to widen both the lower and the upper eyelid.

– *On removed or lost eyes:* If the eye is completely removed there are no other remedies but an eye of glass, stone, silver or other materials resembling as much as possible the other one in color, size and shape. If a part of the eye is left, a "peel" or a hollow plate may be placed upon it.

– *How to remake cut-off lips:* Some take the substance from far away sites as for nose reconstruction from the arm. The loss of the lip can be congenital or can be caused by a wound. Since the lip is soft and wet it can easily be extended and the flesh taken off, chopped up on the edges and then sutured to the contralateral one. Immediately after, gluten or glue should be put on one side and then the other; with exactly opposite strings they are pulled and held together to avoid rupture of the stitches. To speed up healing Eastern Armenian bolus, incense and aloe are added. If a lot of the lip is missing the same technique is followed but in addition the gums must be separated.

– *Lip cancer:* Surgery of lip cancer is very troublesome, dangerous, large and very ugly. Lip cancer is initially treated with medications of lettuce juice and Aaron's rod, or with millet flour, rose oil and cooked wine which refresh and alleviate pain. If cancer does not heal with such remedies surgical treatment is necessary. Several surgeons use burning iron bars to stop the bleeding, but for lip cancer I prefer to cut with a sharp silver coin, or wood made thin, or a sharp horn dipped in "strong water", i. e. the liquid used by jewellers to separate gold from silver. In such way lip cancer is removed with less pain. As a medication, to mitigate pain and block inflammation, put a whole egg over the tow. (Figure 3).

– *Tongue fraenum cutting:* Sometimes newborns are unable to move their tongue

because it adheres to the mouth floor. To avoid danger of death the tongue must be held with a spring and pulled up, then it is cut with a knife and the wound is washed with red wine.

– *Cleft surgery:* The cleft may be missing from birth, and in such case the babies die since they cannot suck the milk, or later by erosion. In the latter case they mangle their words and reject most of the food and drinks from the nostrils. This ailment is often linked to venereal disease (syphilis) and is corrected with a sponge, cotton-wool or a silver plate to close the cleft hole (Figure 4).

Tonsil surgery: (Figure 5) This is very difficult and dangerous surgery both for the massive bleeding after the cut and for the narrowness of the place. The tonsils are pierced with a small hook or with a very thin spring and pulled by the surgeon, then cut away with a small knife while the tongue is lowered with a spatula. The tonsil must be pulled without tearing the tonsil membrane. All of the gland must be cut at the base and then the base itself is gripped with a lace. Then gargle with cold water or water and vinegar drinks.

The above are only some notes taken from Fabrici's book illustrating the interesting techniques once used and some concepts which, obvious for our days, but which in the 16th century – before the discovery of blood circulation – were the result of innovative ideas and careful clinical observations. Among them, notable are those on vascularized stalks, tubulized edges, the concept of correct hemostasis, the need to ensure drill cooling in bone drilling, the blepharoplastic techniques and the importance of medications. All things that, in an age before anesthesia and antibiotics, make Fabrici, together with teachers and scientists of his time, the great forerunners of modern surgery.

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