VERSITA

ARS Medica Tomitana - 2013; 2(73): 61 - 66
DOI: 10.2478/arsm-2013-0011

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Morphology of the terminal aorta

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ABSTRACT
We evaluated the termination of the abdominal aorta in relation with the vertebral column in 142 cases, finding it between middle 1/3 of the L3 vertebra and L5-S1 intervertebral disc. At the level of the L4 vertebra the abdominal aorta ends in 71 of the cases, following, in the order of the frequency, the L4-L5 intervertebral disk with 40 cases, the L5 vertebra with 14 cases, the L3-L4 intervertebral disc with 10 cases, the L3 vertebra with 6 cases and only in one case at the L5-S1 intervertebral disc. The aortic termination above the L4 vertebra was considered a high termination, 11.27% of cases, and the origin below the L4-L5 intervertebral disc was considered a low termination, 10.56% of cases. The bifurcation of the aorta in relation to mid-vertebral line was assessed on 138 cases, with 79 cases on the left, 38 on the midline and in 21 cases the aortic bifurcation was right to the midline.
The distance between the aortic bifurcation and the sacro-vertebral joint (promontory) was between 40 - 82 mm. The aortic bifurcation related to the origin of the inferior vena cava was assessed on 38 cases, finding that most frequently, in 27 cases, the bifurcation was above the level of origin of the inferior vena cava, with a distance of between 2 - 3 mm and up to 45 mm. In 7 cases it was located below the origin of the inferior vena cava and in 4 cases the aortic bifurcation was located at the same level with the origin of the inferior vena cava.

Keywords: aortic termination, morphology

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Introduction

The abdominal aorta continues the thoracic aorta from the diaphragm level, passes anteriorly and to the left of the vertebral column and divides into its terminal branches at the lumbar level, within a range from L3 to L5 vertebrae. It is a "passage" artery for the lower limbs but also a nutrient artery for most of the abdomen and pelvis. It's traject, initially at the left, gradually approaches the midline [7]. The aortic bifurcation is pre-vertebral and median, and according to some authors it can sometimes be slightly to the left of the midline [1]. Located below the posterior parietal peritoneum and on the axial skeleton, the aortic bifurcation is located in the lower lumbar region, just above the sacro-vertebral angle, into the termino-aortic region, occupying approximately the center of this region and representing its directory element [1]. Into the abdomen, along its traject, the aorta is accompanied by the lumbar lymph nodes: the intermediate nodes are interposed between it and the inferior vena cava and the left lumbar nodes are pre-

aortic, latero-aortic or post-aortic.

The bifurcation projects on the anterior abdominal wall approx. 2.5 cm below the umbilicus on a line joining the upper points of the iliac crests [9]. According to [8], the umbilicus is approx. at 2 cm from the aortic bifurcation in 80% of cases. In 20% of cases, the aortic bifurcation is below the umbilicus with 3-4 cm. This relation with the umbilicus depends on the position and weight of the patient. In dorsal decubitus, with hips in extension, the radiological studies showed that the safety distance between the umbilicus and the aorta varies from 2.7 to 18 cm.

Material and method

Our study was performed on a total of 148 cases represented by dissections on human cadavers, plastic injection (Technovit 7140) followed by corrosion and the evaluation of simple and CT abdominal angiographies. The termination of the abdominal aorta was studied from several points of view: in relation to the vertebral column and with the mid-vertebral line, according to the gender and compared with the formation of the inferior vena cava. Not all parameters were followed for the same number of cases.

Results and discussions

The termination of the abdominal aorta in relation with the vertebral column was studied on 142 cases, finding it between middle 1/3 of the L3 vertebra and L5-S1 intervertebral disc (Figures 1–5).

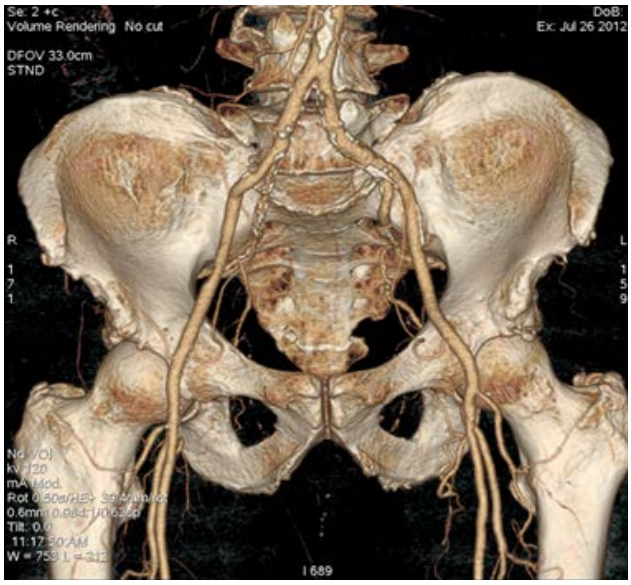

Figure 1 – Aortic termination at the inferior 1/3 of the L4 vertebra, left to the medio-vertebral line.

The distribution of the cases in relation to the vertebral column was as follows:

- middle 1/3 of the L3 vertebra: 3 cases (2.11% of cases);
- inferior 1/3 of the L3 vertebra: 3 cases (2.11% of cases);
- intervertebral disc L3-L4: 10 cases (7.04% of cases);
- upper 1/3 of the L4 vertebra: 23 cases (16.20% of cases), with 2 cases at the level of the upper border of the L4 vertebra (1.41% of cases);
- middle 1/3 of the L4 vertebra: 14 cases (9.86% of cases);
- inferior 1/3 of the L4 vertebra: 34 cases (23.94% of cases), with 12 cases (8.45% of cases) at the inferior border of L4;
- intervertebral disc L4-L5: 40 cases (28.17% of cases);
- upper 1/3 of the L5 vertebra: 11 cases (7.75% of cases), with 2 cases at the level of the upper border of the L5 vertebra (1.41% of cases);
- inferior 1/3 of the L5 vertebra: 3 cases (2.11% of cases);
- intervertebral disc L5-S1: 1 case (0.70% of cases).

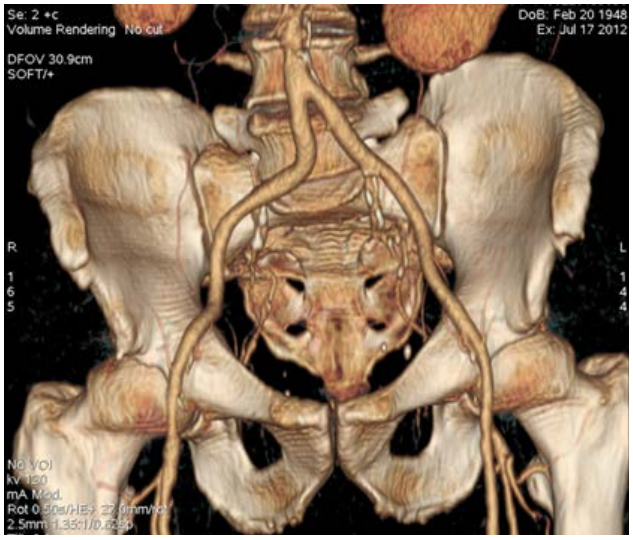

Figure 2 - Aortic termination at the intervertebral disc L4-L5, right to the medio-vertebral line.

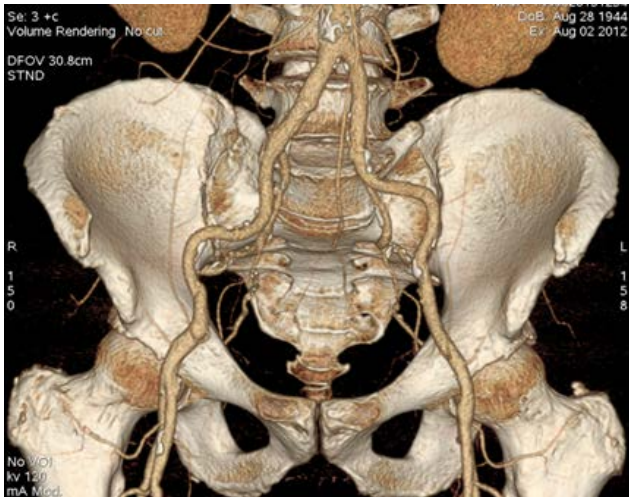

Figure 3 - Aortic termination at the intervertebral disc L3-L4, left to the medio-vertebral line.

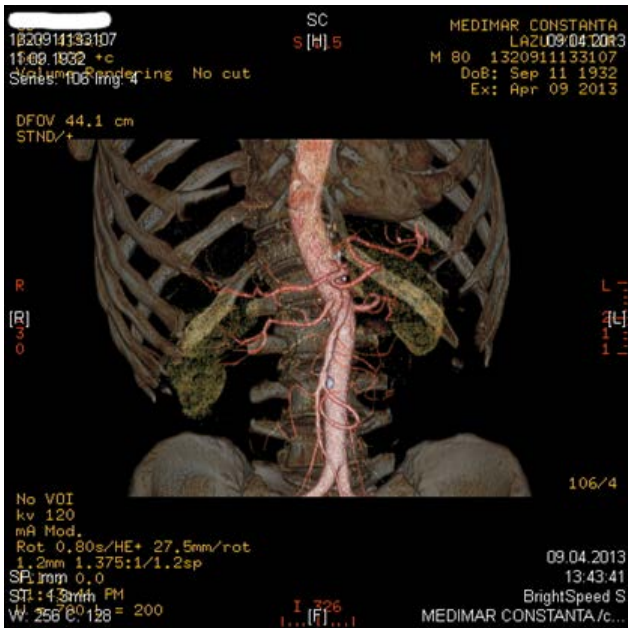

Figure 4 - Aortic termination at the intervertebral disc L5-S1, left to the medio-vertebral line.

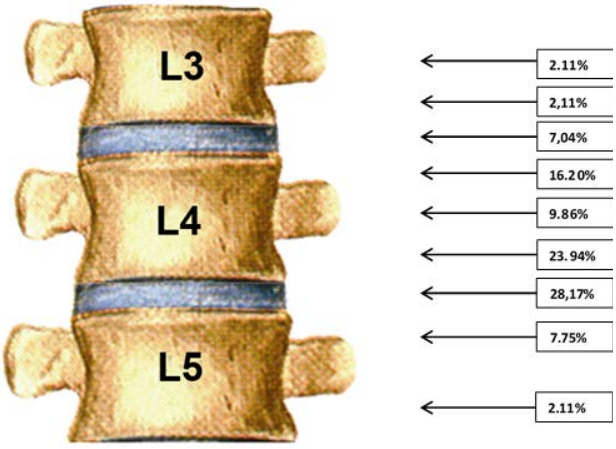

Figure 5 - Aortic termination in relation with the vertebral column.

From our statistics some conclusions emerged. First, we found no gender differences regarding the aortic termination related to the vertebral column; at all levels we encountered arteries in both sexes. At L4 level, the abdominal aorta ends in 71 cases (50% of cases), followed in order of frequency by the end at the L4-L5 intervertebral disc: 40 cases (28.17%

of cases), the L5 vertebra in 14 patients (9.86% of cases), the L3-L4 intervertebral disc in 10 patients (7.04% of cases), the L3 vertebra in 6 patients (4.23% of cases) and only a single case at the intervertebral disc L5-S1. The aortic termination above L4 vertebra was considered a high termination, in 16 cases (11.27% of cases) and the termination below L4-L5 intervertebral disc was considered a low termination, in 15 cases (10.56% of cases, Figure 6). Kamina [8] founds a lower termination in 35% of the cases and a high ending in 24% of cases.

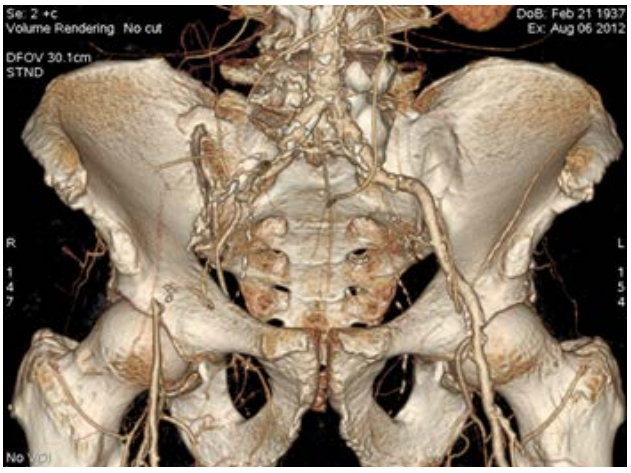

Figure 6 - Low termination of the aorta (inferior 1/3 of the L5) in a female, on mid-vertebral line.

Within literature, the aortic termination related to the vertebral column is quite contradictory (Table I).

Comparing our results with literature, we found that [1,2,3,4,9,12] mention the lower end of the aorta at L4 vertebra, [1] giving a percentage of 70% of cases. Other authors [5, 11] and Krause [quoted by 1 and 2] give the level of termination the L4 vertebra, without indicating any level or a percentage. [8]) gives the level of L4 vertebra in over 47% of cases and [13] in 50% of cases, while us found only a 3% higher percentage compared to [8] and same percentage with [13]. Comparing with the results of [13], at the level of the L3 vertebra we found a higher rate of 2.23% and at the level of L5 vertebra a smaller rate with 29.14%, and very close to the L3-L4 intervertebral disc, with a difference of only 0.04%. At the level of L5 [13] finds the aortic termination with more than 1.30% but did not finds the aortic termination at the intervertebral discs L4-L5 and L5-S1.

Table I - level of bifurcation of the aorta related to the vertebral column

AUTHOR	**Level of aortic bifurcation**
Paturet	inf. border of L4 (70%)
Testut	inf. border of L4
Rouvière	inf. border of L4
Gray	L4 vertebra
Moore	intervertebral disc L4-L5
Krause	L4 vertebra
Pillet	intervertebral disc L4-L5
Kamina	L4 vertebra: 47%; intervertebral disc L4-L5: 72%
Drake	inf. border of L4
Schunke	adult: L4; elderly: L5
Kenneth	L4
Beauthier	inf. border of L4
Pirro	L3: 2%; L4: 50%; disc L3-L4: 7%; L5: 39%; S1: 2%
Personal cases	L3: 4.23%; disc L3-L4: 7.04%; L4: 50%; disc L4-L5: 28.17%; L5: 9.86%; disc L5-S1: 0.70%.

The bifurcation of the aorta in relation to mid-vertebral line was assessed on 138 cases; in 79 cases (57.25% of cases) was at the left of the midline, in 38 cases (27.53% of cases) the bifurcation was located on the midline, and in 21 cases (15.22% of cases), it was at the right of the midline. The deviation from mid-vertebral line was between 1-2 mm to 15 mm. Quoting from the literature [7], Maurer and Portes [cited by 1] found this of 8 mm, to the left of the midline.

In relation to the distance aortic bifurcation - sacro-vertebral joint (promontory), we found it between 40-82 mm while [1] gives 60 mm.

Figure 7 - The aortic bifurcation is higher than the formation of the inferior vena cava

The aortic bifurcation related to the formation of the inferior vena cava (Figure 7), was assessed on 38 cases, founding that, in 27 cases (71.05% of the cases) the aorta bifurcates over the origin of the inferior vena cava, by a distance of between 2-3 mm to 45 mm.

In 7 cases (18.42% of cases), the aortic bifurcation was below the inferior vena cava origin and in 4 cases (10.53% of cases), the aortic bifurcation was located at the same level with the origin of the inferior vena cava. Pirro [13] founded that between the end of the aorta and the origin of the inferior vena cava was a distance of 19 mm.

Figure 8 - The aortic bifurcation is same level with the origin of the inferior vena cava

Conclusions

There are discussions regarding on how the abdominal aorta ends, some authors considering only two terminal branches, others stating as terminal branch also the middle sacral artery. Thus [2] and [3] consider that, at the L4 vertebra or L4-L5 intervertebral disc, the aorta, noticeably thinner because of the numerous branches that emerged during its descent, ends with three branches: an middle artery, smaller, the middle sacral artery and two lateral branches, relatively large, the two common iliac arteries. In reality, as demonstrated by comparative anatomy, the middle sacral artery is not the continuation of the aorta that suffers an atrophy similar to the one of the corresponding vertebral segments, sacrum and coccyx, above which it is situated. Its distribution confirms the homology between the middle sacral

artery and the sacro-coccygeal or caudal aorta in tailed mammals. Consequently, the two common iliac arteries are simple collateral branches of the aorta.

In fact, since the middle sacral artery is very thin compared with the size of the two common iliac arteries, the abdominal aorta appears to bifurcate as an inverted "Y" [1]. Considering the fact that the origin of the middle sacral artery is on the back of the aorta above the aortic bifurcation, we support that is more correct to assess that aorta ends by bifurcation, an opinion also supported by [7] and [8].

The differences with the literature may be the result of the geographical area in which the studies were performed. It is perfectly true that there are morphological differences based on race and even ethnic groups, but variations are highly dependent on age and, especially, on the number of studied cases and working methods, obtaining different results when morphometry is performed on fresh or formalin preserved bodies, or by injection molding; the most accurate measurements are those of ultrasound or CT, and this can vary according to the incidence in which they have been exposed.

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ARS Medica Tomitana - 2013; 2(73): 67 - 73
DOI: 10.2478/arsm-2013-0012

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Morphological characteristics of the aortic arch organization

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ABSTRACT
Our study was performed on 228 cases by dissection, by plastic injection followed by corrosion or dissection and by simple and CT angiography study. Each morphological aspect was assessed on a different numbers of cases, as long as the same case could not provide data on all studied elements. We assessed: the number of branches that originate from the aortic arch, the level of origin and the morphological type of the aortic arch. In terms of number of branches emerging from the aortic arch, most commonly are three branches, in 48.48% of cases, describing them 3 variations: separation of the three classical branches in 45,96% of cases, in 1.51% of cases the left common carotid artery emerged from the brachiocephalic trunk while the other two branches being represented by a vertebral artery and the left subclavian and in 1.01% by the right subclavian artery with retroesophageal traject, by a bicarotid arterial trunk and the left subclavian artery. In 28.70% of the cases were four branches, as follows: in 13.13% of cases the fourth branch was represented by the left vertebral artery, in 7.07% of cases there was the inferior thyroid artery, in 4.04% of cases the brachiocephalic arterial trunk was missing and the right subclavian artery originate from the aortic arch and presented a retroesophageal traject, in 3.03% of cases the fourth artery was the ascending cervical and in 1.51% of cases all four arteries had their origins in the aortic arch with no brachiocephalic trunk. In 22.73% of cases from the aortic arch originated only two branches: in 19.70% of cases the left common carotid originated in the brachiocephalic trunk, so the second branch was the left subclavian and in 3.03% of the cases there were two brachiocephalic trunks. Regarding the level of origin from the aortic arch, we found that only the brachiocephalic arterial trunk showed versions of origin: in 64 61% of the cases the brachiocephalic trunk had its origin in the horizontal segment of the aortic arch, in 21.54% of cases the origin was located at the limit between the ascending and horizontal segments and in 12.31% of cases the origin was from the ascending segment of the aortic arch. In only 1.54% of the cases the left subclavian artery originated from the descending segment of the aortic arch.

Keywords: aortic arch: branches, origin, morphological type

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Introduction

It is well known that heart and vascular illnesses now occupies the first place in the pathology of modern society, which has led to declare them as the public enemy number one. Ever-increasing frequency of the arterial pathology, especially traumatic, degenerative and congenital, the invalidation of the active ages, the duration and the progressive nature of this severe and aggravating disease, all are features of cardiovascular diseases. The etiology of this disease includes many factors, from genetic inheritance of the individual to a multitude of elements such as macro and micro-climate, infection, trauma, etc. The problem of the cardiovascular diseases is aimed all over medical world; within the WHO there's a section that deals with the prevention and control of the cardiovascular disease.

In the study of cardiovascular diseases, the knowledge of the anatomy and pathophysiology of the heart, aorta and its branches is a primordial condition. Cardiovascular surgery (open heart surgery) took an impressive development in recent years due to new acquisitions in exploration, new operative techniques and use of increasingly refined and sophisticated equipment. The search for new cardiovascular operative techniques imposes new anatomo-surgical studies, which led to the re-evaluation of the studies on heart, aorta and great vessels; a special attention is aimed towards the aortic arch: morphometry, structure, collateral branches and their variations, congenital abnormalities. The anatomical variations of the aortic arch and its branches were and are still described nowadays: the middle thyroid artery was described in 1772 simultaneously by Neubauer and Erdmann [quoted by 1]. According to Guillem [1], the first description of an aortic anomaly dates from eighteenth-century when Hommel [cited by 1] introduces the term "lusus naturae" (the game of nature), hence the subsequent term of "arteria lusoria ". Right aortic arches are rare congenital anomalies, but not exceptional, their frequency was 0.1% [Hastreiter, Maas, quoted by 1]. The first case of right aortic arch is classically attributed to Fioratti and Aglieti in 1739 [1]. It took more than two centuries until the first successful surgical treatment of a vascular ring is reported [Gross, 1948, cited by 1]. In 1948 Edwards proposed the first universally recognized classification of this data [1].

Materials and methods

Our study was performed on 228 cases of which 61 cases by dissection, 42 cases of plastic injection (Technovit 7143) followed by dissection or corrosion, 52 cases were represented by single angiography and 73 cases of angioCT. Each morphological aspect was assessed on a different numbers of cases because the same case could not provide data on all studied parts. The angiographies came from Medimar Exploration Center in the Emergency Hospital in Constanta, being executed on a GE LightSpeed 16 Slice CT Scanner. We also examined angiographies from Pozimed Diagnostic Center, being executed on a GE LightSpeed VCT64 Slice CT Scanner. We evaluated: the number of branches that originate from the aortic arch, the level of origin and the morphological type of the aortic arch.

Results

The number of branches emerging from the aortic arch was studied on 198 cases; the most common type of the aortic arch is the one with three branches, in 96 cases (48.48% of cases), describing it 3 variations:

1. classical separation of the three branches (brachiocephalic arterial trunk, left common carotid and left subclavian) in 91 cases (45.96% of cases, Figure 1);

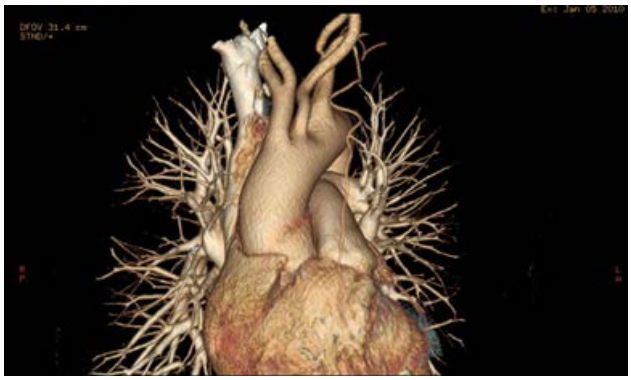

Figure 1 - Aortic arch with three branches; the left common carotid is the closest to the brachiocephalic trunk

2. in three cases (1.51% of cases) the left common carotid artery originated from the brachiocephalic trunk while the other two branches being represented by a vertebral artery and the left subclavian;

3. in 2 cases (1.01% of cases) the right

subclavian artery, originating from the aortic arch showed a retroesophageal traject, the other two branches being represented by a bicarotid arterial trunk and the left subclavian artery (Figure 2).

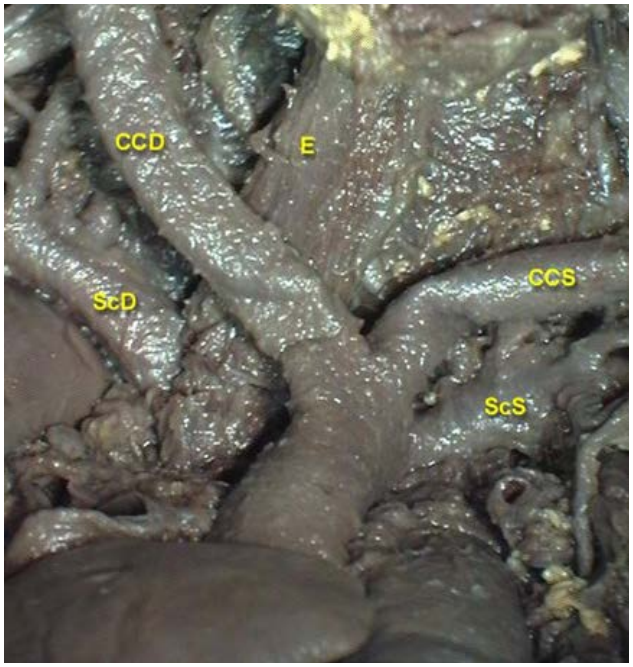

Figure 2 - Right subclavian artery with retroesophageal traject. Bi-carotid trunk

In 57 cases (28.70% of cases), the aortic arch gave loose four branches, with several variations:

1. most frequently, in 26 cases (13.13% of the cases), the fourth branch was represented by the left vertebral artery;

2. in 14 cases (7.07% of cases) the fourth branch of the aortic arch was represented by an inferior thyroid artery (Figure 3);

3. in 8 cases (4.04% of cases) there was no brachiocephalic arterial trunk, the left subclavian artery originating from the aortic arch with retroesophageal traject, the other two branches of the aortic arch being represented by a bicarotid arterial trunk and a left subclavian artery;

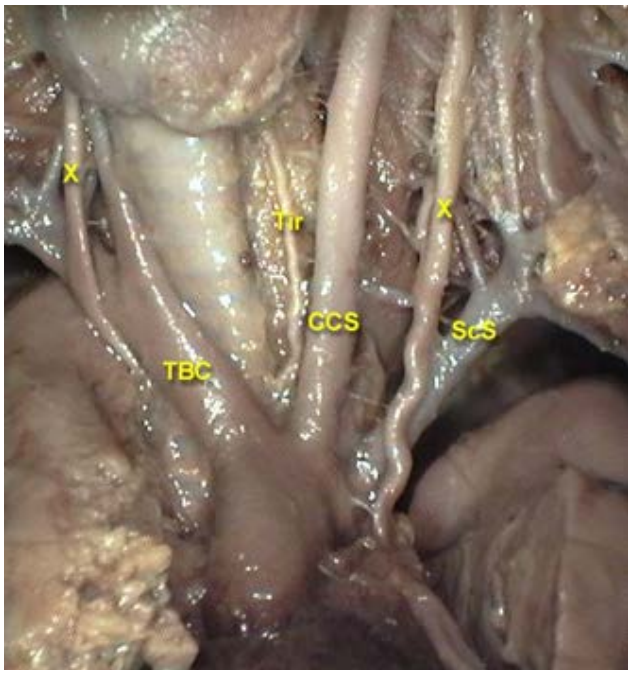

Figure 3 - Inferior thyroid artery originating from the aortic arch between the brachiocephalic trunk and the left common carotid

4. in 6 cases (3.03% of cases) the fourth artery was the ascending cervical artery (Figure 4);

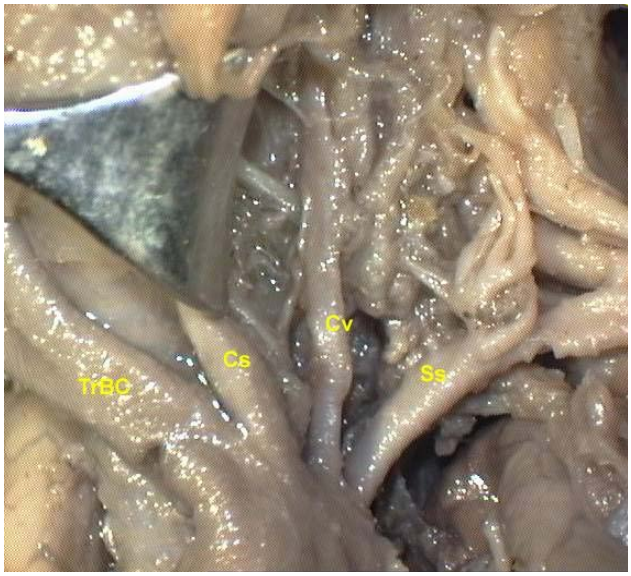

Figure 4 - Ascending cervical artery originating from the aortic arch

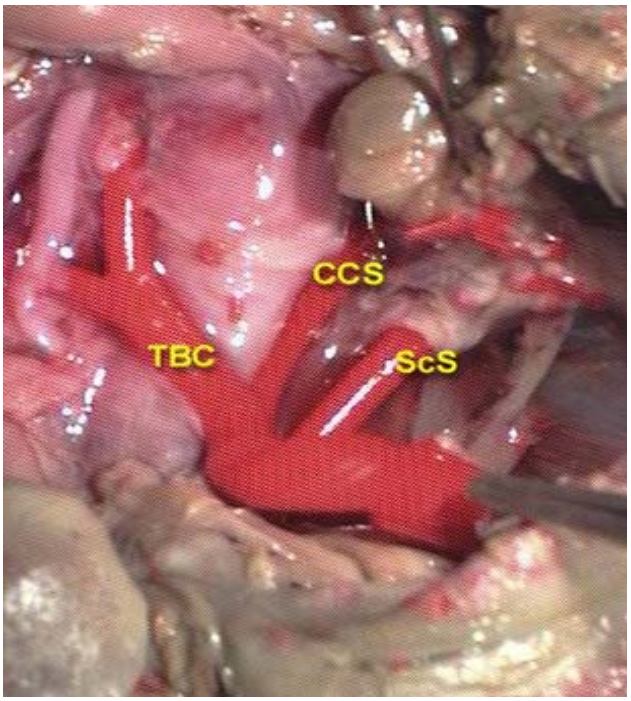

Figure 5 - Left common carotid artery originating from the brachiocephalic trunk

5. in 3 cases (1.51% of cases) all four classic branches originated from the aortic arch (Figure 6).

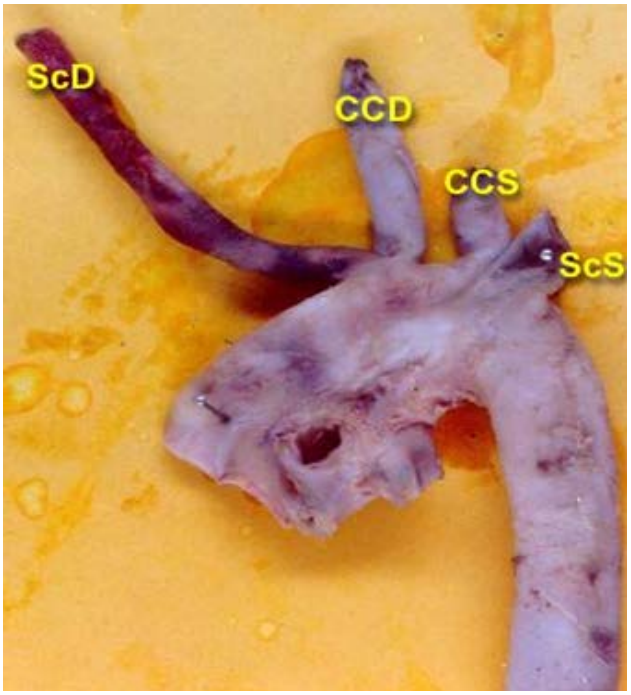

Figure 6 – Absence of the brachiocephalic trunk; the 4 arterial branches originate directly from the aortic arch

In 45 cases (22.73% of cases) there was no brachiocephalic trunk, the aortic arch giving only two branches, with two options: 1. most commonly, the left common carotid originated in the brachiocephalic trunk in 39 cases (19.70% of cases), the second branch being the left subclavian artery; 2. in 6 cases (3.03% of cases), there were two brachiocephalic arterial trunks, right and left (Figure 7).

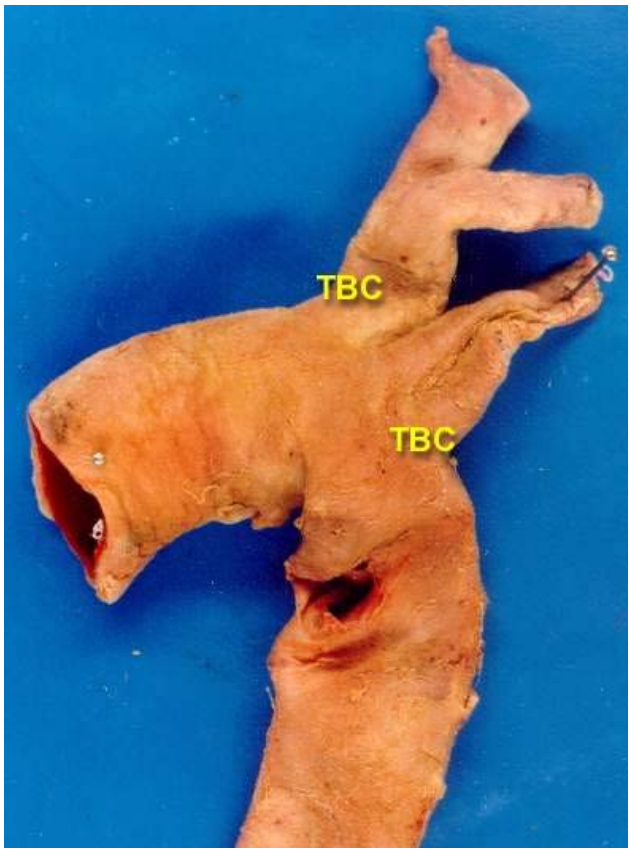

Figure 7 - Coexistence of two brachiocephalic trunks

Assessing the level of origin of the branches of the aortic arch in 195 cases, we found that only the brachiocephalic arterial trunk shows variations of origin, the other aortic branches starting from the horizontal segment of the arch, except for three cases (1.54% of cases) when the left subclavian artery originated from the descending segment of the aortic arch. In 126 cases (64.61% of cases) the brachiocephalic trunk originated from the horizontal segment of the aortic arch, in 42 cases (21.54% of cases) the origin was located at the limit between the

ascending and the horizontal segments and in 24 cases (12.31% of cases) the origin was from the ascending segment of the aortic arch.

The aortic arch traject and shape are related to the traject of the ascending and descending segments. The ascending segment of the aorta may present three types of traject: supero-medial oblique to the right, vertical or supero-lateral oblique to the left. When the two segments of the aorta, the ascending and the descending one are closer (33.9 to 40 mm), the aortic arch is considered to be "narrow", its horizontal portion is short and the distance between its collateral branches is reduced (Figure 8). When the two aortic segments are far apart (over 40 mm), the aortic arch is "large" and the distance between the three branches is bigger. The classical type, found in 57 cases (44.53% of cases) showed a regular version, with the three branches equidistant from one another and another version in which the left common carotid artery may be located closer to the brachiocephalic trunk or to the left subclavian artery.

Figure 8 - "Narrow" aortic arch: transverse distance is 38.5 mm

Discussions

Regarding the number of arterial branches emerging from the aortic arch, classical authors noted that, most frequently, arise three arteries but statistics are not quite well defined. [2] on 33 cadavers, founds three branches in a proportion of 82% of the cases, 12% of the cases with two branches (males only), and 6% of the cases with 4 branches (only in females). [3] founds 3 branches in 84% of the cases. In comparison, we found three branches in a lower percentage of 36.04% than [2] and of 48.04% than [3]. In our study we met more frequently the variation with four branches, up 22.79% than [2] and with two branches, up to 10.73% than [2]. Referring to the inferior thyroid artery, Olivier [quoted by 4] finds it frequently as having its origin in the aortic arch, rarely in the right common carotid and exceptionally from the left internal thoracic artery. For [5], the origin of the inferior thyroid artery is, in 75% of cases, from the brachiocephalic trunk, being rare from the aortic arch, even exceptional. Braine and Funck [cited by 4] found that the aortic origin of the inferior thyroid artery is to the right of the midline, and [6] states that in 15% of the cases the inferior thyroid artery origin is inconsistent. Also [6] states that the brachiocephalic trunk may be absent, so all four arteries will separately originate from the aortic arch. A more complex statistic we met in [7], which describe several variants of the aortic arch branches. Thus, he founds the origin of the left vertebral artery from the aortic arch in 7-8% of cases (we found it more frequently with 5.13%) and the inferior thyroid in 1% of cases (we found it more frequently with 6.07%). Lippert [7] found in 1% of cases the presence of the "arteria lusoria" (the right subclavian artery as the final branch of the aortic arch, passing under the ascending aorta) a variation described by [8], but we did not find this version. Also [8] gives a percentage of less than 1% of cases for each of the following: two brachiocephalic trunks (we found 2.03% higher), bicarotid trunk (we found a similar percentage), missing brachiocephalic trunk (we found 0.51% higher), left brachiocephalic trunk (we

found 2% higher), right aortic arch and double aortic arch (aspects that we have not met). According to [9], the bicarotid trunk is associated with retroesophageal right subclavian artery or with a common trunk for left subclavian and left vertebral arteries. [10] describes a common arterial trunk formed by the brachiocephalic trunk, left common carotid and left subclavian.

Another author [4] states that the origin of the brachiocephalic trunk may be at the union of the ascending aorta with the horizontal segment, 3-5 mm anterior and to the right of the left common carotid. Also, [2] shows that the brachiocephalic trunk arises from the ascending aortic segment in 61% of cases, while we found it in a lower percentage of 48.69%.

Conclusions

The study of the aortic arch shows a particular interest in terms of morphology, pathophysiology and clinics due to frequency of variations and diseases (congenital or acquired) at this level; it also shows an imaging interest due to frequent ultrasounds and angiographies within medical practice but mostly a surgical interest, by the impressive development of the cardiovascular surgery, the cardiac and aortic grafts and the coronary bypasses.

This study shows that, according the origin and the arrangement of its branches, the aortic arch may be described as : the classical type (trident) and variations (two or four branches, or variations of the samples with three branches, such as a left common carotid artery originating from the brachiocephalic trunk, with the third branch the left vertebral artery). The variations of the aortic arch are more frequent, 107 cases (54.04% of cases) than the classic aspect with three branches; thus, we describe a regular version, with the three branches at equal distance from each other, and another variation with the left common carotid artery closer to the brachiocephalic trunk or to the left subclavian artery. Among the variations, most commonly we met origin of the left vertebral artery from the aortic arch in 29 cases (14.65% of cases), both in cases with three or four aortic branches (more frequently).

The statistical differences between the results we found and the existing data in the literature may result from the total number of studied cases and also from the working methods.

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 74 - 78
DOI: 10.2478/arsm-2013-0013

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Morphological characteristics of the external carotid artery

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ABSTRACT

The morphological characteristics at the level of the bifurcation of the common carotid artery were studied on 46 cases, finding that the most frequent, in 52.17% of cases, the common carotid bifurcation appear as the letter "V", with two possible variations: a wide "V", in 43.48% of cases and narrow "V" in 8.7% of cases. In 30.43% of cases, the two carotids showed an ascending traject, united for 1-2 cm up to their crossing; in 13,04% of the cases the two arteries were superimposed, the external located anteriorly. In only in two cases on the right side (4.35% of cases and 8.33% of right samples) we found a peculiar aspect of a "U" shaped bifurcation. Regarding the caliber of the external carotid artery, we found that in 43.33% of the cases the external carotid artery had a similar diameter to the internal carotid, also in 43.33% of the external carotid artery have a higher caliber than internal one and the remaining 13.33% of the cases, the external carotid artery had a smaller diameter than the internal one, with all cases on the left (16.67% of left carotid arteries).

The caliber of the right external carotid artery was between 4 to 5.6 mm and the one of the left was between 3.6 to 5 mm. When the external carotid was more voluminous than the internal, the differences were 0.5 to 1.2 mm and when the internal carotid was more voluminous than the external, the differences were smaller, 0.2 to 0.8 mm. In relation to the common carotid, the external carotid had a smaller caliber from 0.6 to 1.1 mm.

Regarding the external carotid traject, most commonly, from the bifurcation of the common carotid, the external carotid artery showed a vertical trajectory, in 50% of cases; in 40% of cases, the traject was oblique superomedially and in 6.67% of cases the external carotid artery described a curve with the convexity facing laterally, with all cases on the right (11.76% of right carotid arteries); in 3.33% of cases, both on the left (7.69% of the left carotid arteries), the external carotid artery traject described an inverted italic "S".

Keywords: external carotid, morphology

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Introduction

The carotid bundle rises vertically from the base of the neck to the base of the skull, dividing at the level of the fourth cervical vertebrae, thus allowing to describe a common carotid artery prior to the bifurcation, an internal carotid artery that continues the path and enters the skull, supplying its content and an external carotid artery, distributed to the face and the neck [1,2,3,4,5,6]. The common carotid bifurcation is at level of the fourth cervical vertebra or the intervertebral disc C3-C4, the big cornu of the hyoid bone or the superior cornu of the thyroid cartilage [1,2,3,4,5,6]. [7] describes cases of high bifurcation of the common carotid (between vertebrae C2-C3) while [8] describes a case of low bifurcation, next to the vertebra C6 probably the lowest level quoted in the literature. The external carotid artery passes successively through the lower portion of the retro-styloid space (posterior sub-

parotidian) and the parotid lodge, within the middle of glandular parenchyma [1,2,3,4,5,6]. At the passage from the retro-styloid space to the parotid lodge it pierces the inferior portion of the styloid septum into the inferior part of the prestylo-hyoidian triangle, specifically between the stylo-hyoid muscle laterally and the stylo-hyoid ligament medially. It ends posterior to the mandibular ramus, into the parotid gland, bifurcating into the superficial temporal and maxillary arteries. The external carotid artery gives six collateral branches: the superior thyroid, ascending pharyngeal, lingual, facial, occipital and posterior auricular arteries [1,2,3,4,5,6].

Materials and methods

The study was performed on a total of 80 cases, represented by the human cadavers and CT angiography, performed on a computer GE LightSpeed VCT64 Slice CT Scanner. We evaluated the morphological characteristics of the bifurcation of the common carotid artery, the external carotid caliber and traject. The studied aspects are described as compared to common and internal carotid arteries, on the right and on the left.

Results

The morphological characteristics of the bifurcation of the common carotid were studied on 46 cases of which 24 cases were on the right side (52.17% of cases) and 22 cases on the left (47.83% of cases). We found most frequently in 24 cases (52.17% of cases), that the common carotid bifurcation appears as the letter "V", 12 cases for the right common carotid artery (50% of right ones) and also 12 cases arteries for the left common carotid artery (54.55% of the left ones). This pattern showed two variations: in 20 cases (43.48% of cases) the bifurcation described a wide "V", while in 4 cases (8.7% of cases) the "V" was narrow, with closer arms (Figure 1).

Figure 1 - Bifurcation of the right common carotid in wide "V", lower than the bifurcation of the left common carotid in narrow "V"

In 14 cases (30.43% of cases), the two carotids, external and internal, showed an ascending traject, next one to another for about 1-2 cm, up to their crossing, with 8 cases on the right (33.33% of right arteries) and 6 cases on the left (27.27% of the left arteries). In 6 cases (13.04% of cases) at the bifurcation, the two arteries were superimposed with the external carotid artery anteriorly, 2 cases on the right (8.33% of right arteries) and 4 cases on the left (18.18% of the left arteries). In only two cases, both on the right side (4.35% of all cases and 8.33% of right cases) we met a particular aspect of a "U" shaped bifurcation, with the internal carotid passing horizontally towards laterally for a distance of about 3 mm, then vertically, up to the crossing with external carotid (Figure 2).

Figure 2 - A "U" shaped bifurcation of the common carotid, with the internal carotid passing horizontally towards laterally for a distance of about 3-4 mm, then vertically. The caliber of the external carotid at origin is equal with the one of the internal carotid.

In 60 cases we studied the caliber of the external carotid artery at origin, 36 cases on the right external carotid artery (60% of cases) and 24 cases of left external carotid artery (40% of cases) (Figure 3).

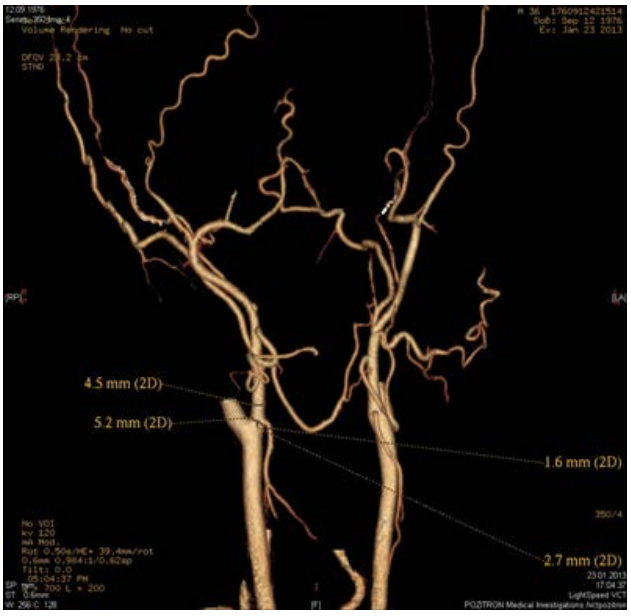

Figure 3 - Right external carotid artery with a caliber of 5.2mm at origin; above the origin of the superior thyroid artery the caliber is 4.5mm

We found that in 26 cases (43.33% of cases) the external carotid artery had a caliber equal to the one of the internal carotid artery, 14 cases were on the right side (38.89% of right carotid arteries) and 12 cases on the left (50% of left carotid arteries). Also in 26 cases, the external carotid artery showed a diameter greater than the internal one, with 22 cases on the right (61.11% of the right carotid arteries) and 4 cases on the left (16.67% of the left carotid arteries). In the remaining 8 cases (13.33% of cases), the external carotid artery had a diameter smaller than the internal one, all cases being on the left (16.67% of left carotid arteries).

The caliber of the right external carotid artery was between 4 to 5.6 mm while the caliber of the left external carotid artery was between 3.6 to 5 mm. When the external carotid was more voluminous than the internal one, the differences were 0,5-1,2 mm, and when the internal carotid was more voluminous than the external, the differences were smaller, 0.2 to 0.8 mm . In relation to the common carotid, the external carotid showed a smaller caliber from 0.6 to 1.1 mm.

The traject of the external carotid artery was assessed on 60 cases, 34 right external carotid arteries (56.67% of cases) and 26 left (43.33% of cases). Most commonly, from the bifurcation of the common carotid artery, the external carotid shows a vertical trajectory, in 30 cases (50% of cases), 14 cases on the right (41.18% of the right carotid arteries) and 16 cases on the left (61.54% of left carotid arteries). In 24 cases (40% of cases), the external carotid arteries were oblique supero-medially, 16 cases on the right (47.06% of right carotid arteries) and 8 cases on the left (30.77% of left carotid arteries). In 4 cases (6.67% of cases), all on the right side (11.76% of right carotid arteries), the external carotid artery described a curve with the convexity oriented laterally and in 2 cases (3.33% of cases), both on the left (7.69% of the left carotid arteries), the external carotid artery described a double curve, with the aspect of an inverted italic "S" (Figure 4). At the origin the external carotid artery may cover all or part of the internal carotid artery, which is located on a posterior plane, or, in cases when its size is smaller than the internal carotid artery, it may be placed on its anterior face.

Figure 4 - Right external carotid artery with a vertical traject, crossed posteriorly by the internal carotid that shows an inverted italic "S" around the external. The right external carotid is larger than the left one. The left external carotid artery is oblique supero-laterally, initially on the anterior face of the internal, which is larger

Discussions

According to [4,9,10,11], from the bifurcation of the common carotid artery, the external carotid describe a vertical traject for about 2 cm, an aspect that we encountered in 50% of cases. According to [2,3,5,12], the initial portion of the external carotid artery up to the level of the crossing with the internal carotid showed a supero-lateral traject, an aspect that we encountered in 40% of cases. The other two traject patterns that we described (curved with lateral convexity and italic "S") were not found as quoted in the studied literature.

The anterior crossing of the internal carotid artery by the external may occur after the origin of some of its collateral branches while its terminal bifurcation occurs laterally to the internal carotid. In these cases, the collateral branches of the external carotid detach very close one to another, an aspect signaled by [7] that describes an unusual ramification of the right external carotid artery: at its origin starts the superior thyroid artery and immediately above emerges the lingual, facial and occipital arteries; the posterior auricular artery starts from the occipital artery. This anomaly was unilateral, without being accompanied by other vascular anomaly. A similar case found by us, showed some collateral branches of the external carotid emerging below the cross of the two carotids (Figure 5).

Figure 5 - Left external carotid artery with vertical traject, crosses the internal one after giving birth to the occipital artery; the occipital artery crosses anteriorly the internal carotid, both passing laterally

Regarding the caliber of the external carotid artery, we've found it between 4 to 5.6 mm on the right and from 3.6 to 5 mm on the left, so right-left differences between 0.4 to 0.6 mm. According to [5,9,10,11], the caliber is about 8 mm while [13] gives an equal caliber with the internal carotid artery, sometimes smaller. [14], working on human fetuses, found an average difference between the right and left carotid of 0.02 mm in males and a difference of 0.19 mm in females. Also [14] founds a similar average

difference between the calibers of the external and internal carotids (0.92) in males on both sides of the body and in females a difference of 0.86 mm on the right and 1.02 mm on the left side. Between the caliber of the internal and the external carotid (14) found in males a mean difference of 0.8 mm on the right and of 0.79 mm on the left side. In females the difference on the right was 0.79 mm (less only by 0.01 mm from males) and 0.71 mm on the left (less with 0.08 mm to males). [15] found in fetuses an average difference between the right and the left carotid arteries of 1.19 mm in females and a difference of 0.93 mm in males and an average difference between external and internal carotids size of 1.19 in females, while males showed a difference of 0.93 mm. Between the calibers of the common carotid and the external carotid, [15] found an average difference of 0.56 mm both in males and females.

Conclusions

The study shows a significant variability of the terminal bifurcation of the common carotid and also of the caliber and traject of the external carotid, noticing a frequent right-left asymmetry; rarely, they showed similar characteristics. The statistical differences between our results and existing data in the consulted literature are due primarily to the total number of studied cases and also to the working methods.

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 79 - 83
DOI: 10.2478/arsm-2013-0014

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Characteristics of some anatomical landmarks on the anterior face of the maxilla

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ABSTRACT
The canine bossa (not listed in TA) was clearly visible in 80% of cases, less prominent in 12% of cases or even absent in 8% of cases. The most commonly is oval in shape with the long axis oriented vertically or slightly oblique infero-medially. In 60% of cases the two fossae showed approximately equal sizes. For the rest of the 40% of the cases, the left one was larger (24 cases) than the right one. In 12% of cases we found a dehiscent anterior wall of the canine fossa for more than half of its height. The myrtiform fossa (also not mentioned in the TA) was oval, with the long axis oriented vertically and with same dimensions bilaterally in 60% of cases. In 2/3 of cases was evident (deeper) on the right. In 28% of cases we found it rounded, more frequently also on the right and in 12% of cases we found it as having an irregular shape. In about 10% of cases have it was almost flat. The canine fossa (Fossa canina) has various shapes, more frequently rounded with an average diameter of 0.8-0.9 cm. In 30% of cases was oval, with vertical long axis of 1 cm in and 0.7 cm width. The cases of rounded canine fossa, well circumscribed and deeper, were more prevalent on the left. The infraorbital foramen (Foramen infraorbitale) was circular in equal proportions (in half of the cases), with a diameter of 2.5-5 mm, or oval, with 3-5 mm vertical axis and 1.5-3 mm horizontal axis. Note the difference in shape in the same skull: circular on the left and oval on the right (most frequent case) or vice versa. The distance from the infraorbital border is variable, being lower on the left in 65% of cases. Compared to the piriform aperture, the infraorbital foramen is located at 0.9 to 1.7 cm on the right and at 1.2-1.7 cm on the left. We encountered five cases with double infraorbital foramen. The intermaxillary suture is vertical in only 35% of cases. In other cases it is deviated to the left in 40% of cases, and in 25% of the cases is oriented to the right. The degree of inclination is variable, making with the horizontal an angle between 95 to 1100. The alveolar process (Procesus alveolaris) is wider posteriorly. There is a difference in width right-to-left, being wider on the right side in 40% of cases (6-13 mm), are the same size on both sides in 30% of cases, the other 30% of cases being thicker on the left. The zygomatic process (Procesus zygomaticus) may be sharp or, more frequently, with a serrated or rounded edge and with a small tubercle in almost 50% of cases.

Keywords: maxilla - anatomic landmarks

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Introduction

The maxilla or the upper jaw is a pair and irregular bone, bulky, occupying the center of the face. It articulates with other bones of the face, which are arranged around it. The maxillary bones contribute to the formation of the bony palate, of the buccal and nasal cavities, of the orbit and of the infratemporal and pterygopalatine fossae. Each maxilla is formed by two bones sutured during the embryologic development: the proper maxilla and the incisive bone [1,2,3,4]. Maxilla has a body and four processes; the body (corpus maxillae) has the shape of a triangular pyramid, with four faces (orbital, anterior, infratemporal and nasal), four borders, a base and an apex. The anterior face (Facies anterior) or lateral is concave. At 5-8 mm below the orbital margin is the infraorbital foramen (Foramen infraorbitale), which may continue inferiorly as a groove. Through this opening passes the suborbital vascular-nervous bundle. The infraorbital foramen is located on the vertical line passing through the supraorbital notch of the frontal bone and the mental foramen of the mandible. Above the roots of the two premolars and

posterior to the canine bossa on the alveolar process is located the canine fossa (Fossa canina) and anterior to the canine bossa, above the incisors, lies the myrtiform fossa [2,5,6,7,8,9,10,11,12]. The anterior face of the maxilla ends medially with the nasal incisure (Incisura nasalis), which along with maxilla corresponding to the opposite side, with the lower border of the nasal bones and with the intermaxillary bone defines the piriform aperture (Apertura piriformis).

Materials and methods

The morphological study of the maxilla was performed on a total of 50 skulls and on the iconography and casuistry of the Discipline of anatomy at the Faculty of Medicine, Constanta. For the external morphology of the maxilla we used the classical measurements of the anatomical landmarks; for all of these bony landmarks we studied their dimensions (length, width and depth), the shape and their location on the bone. The measurements were performed using the instruments of the anthropometric kit of the discipline of anatomy.

Results and Discussions

The canine bossa (not listed in TA) was clearly visible in 80% of cases, less prominent in 12% of cases or even absent in 8% of cases. When visible, the most commonly is oval in shape with the long axis oriented vertically (most of cases) or slightly oblique infero-medially. In 60% of cases the two fossae showed approximately equal sizes. For the rest of the 40% of the cases, the left one was larger (24 cases) than the right one. In 12% of cases we found a dehiscent anterior wall of the canine fossa for more than half of its height. According to [1,2,3,4,5], it corresponds to the root of the canine, being placed between the canine and myrtiform fossae. Some authors [6,7,8] called it canine eminence while [9] called it canine jugulum, representing a vertical bony prominence that separate the incisive and canine fossae (Figure 1).

Figure 1 - Maxilla, anterior view; asymmetric piriform aperture with right inferior border located below the left one; canine bossae with thin anterior wall; right myrtiform fossa is oval, while the left one is rounded; prominent anterior nasal spine; unequal infraorbital foramens with different shapes; the right infraorbital foramen is double and located laterally to the supraorbitar notch same side, high, vertical intermaxillary suture, well visible and shallower within the inter-incisive space

The myrtiform fossa (also not mentioned in the TA) was oval, with the long axis oriented vertically and with same dimensions bilaterally in 60% of cases. In 2/3 of cases was evident (deeper) on the right. In 28% of cases we found it rounded, more frequently also on the right and in 12% of cases we found it as having an irregular shape. We noticed a significant dimensional difference in relation to its shape: is larger when oval (0.8-1.5 cm high and 0.5-1 cm transverse diameter). In about 10% of cases have it was almost flat. According to [1,10] is located medially to the canine bossa, [11] homologates it as canine fossa and [6,7,8,9] names it incisive fossa.

The canine fossa (Fossa canina), as the myrtiform one, has various shapes; more frequently was rounded, with an average diameter of 0.8-0.9 cm. In 30% of cases was oval, with the vertical long axis

of 1 cm in and 0.7 cm width. The cases of rounded canine fossa, well circumscribed and deeper, were more prevalent on the left. According to [6], the canine fossa lies superior up to the lower border of the infraorbital foramen. For [7] the canine fossa is located below the infraorbital foramen and gives attachment to the levator anguli oris muscle. Into the canine fossa is performed the trepanation of the maxillary sinus, the Caldweel-Luc procedure [7] (Figures 2 and 3).

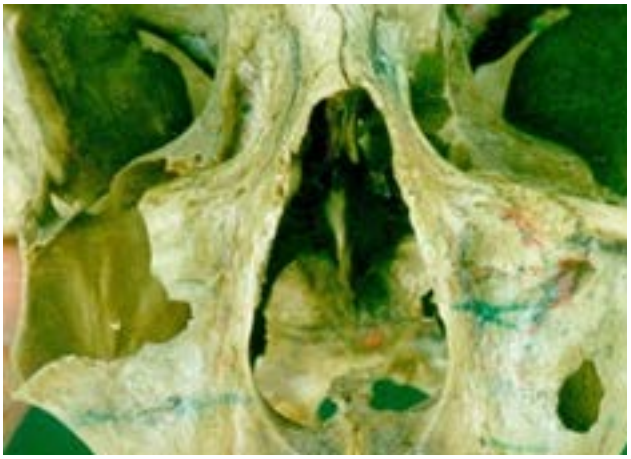

Figure 2 - Maxilla, anterior view; the anterior walls of the canine bossae are thin; symmetric piriform aperture; maxillary sinus with thin walls, with malar and orbital prominences, high, vertical intermaxillary suture, well visible within the inter-incisive space

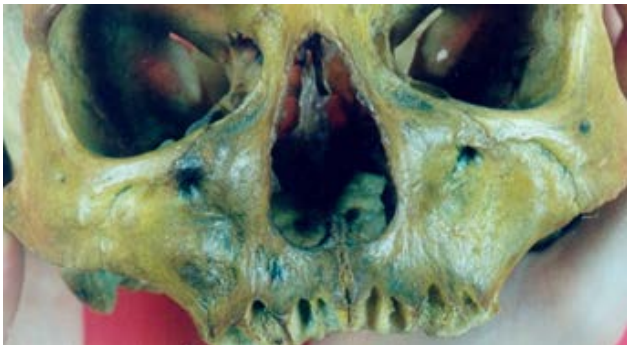

Figure 3 - Deep canine bossae, the right one more prominent; bony crest between canine and infraorbital fossae; prominent infraorbital margins; large, round infraorbital foramens; slightly asymmetric piriform aperture; bony prominence corresponding to the first premolar; vertical, short intermaxillary suture

It is well known the fact that is very difficult to determine the characteristics of the human skull, as long as the complexity and variability of the elements that constitute it impose major difficulty of this action. This aspect is more evident in the canine fossa. This depression of the maxilla is really variable in size and depth. This is often called the infraorbital fossa, but some authors state that it must distinguish between the infraorbital fossa and the canine fossa [1,12], although it is not nominated in Terminologia Anatomica. Each of these terms designates a different entity. The best structure that reflects the shape of the anterolateral part of the maxilla is the infraorbital fossa. We have encountered cases in which it could make a clear distinction between the infraorbital fossa and the canine fossa, the latter being located in the infero-medial infraorbital fossa, at the bottom of the maxilla. In some cases there is an oblique infero-lateral bony ridge, which separates the infraorbital fossa in a supero-lateral surface and a infero-medial one, above the canine fossa.

We established relationships between the shape of the maxilla and some morphological characteristics of the bony face: alveolar prognathism and protruding cheekbones with the depth of the infraorbital fossa. The infraorbital and the canine fossae, described by the classics are always on the anterior face of the maxilla.

Figure 4 - Maxilla, anterior view; prominent bony crest between canine and infraorbital fossae; double left infraorbital foramen; slightly asymmetric piriform aperture

The canine crest divides the anterior face of the maxilla into an internal part, infranasal and

an external one, infraorbital. This face is generally concave and appears as a large depression more or less profound: the infraorbital fossa (Figure 4). It is defined as infraorbital fossa the portion of the maxilla located between the inferior orbital margin superiorly, the alveolar arch inferiorly, the nasal incisure and the canine crest antero-medially and the zygomatico-malar suture and submaxillary crest postero-laterally

The canine fossa appears as a depression more or less profound and circumscribed by the infraorbital fossa. Its surface is irregular, corrugate and gives attachment to the levator anguli oris muscle. This description allows differentiating the infraorbital fossa, a constant element of the maxilla, from the canine fossa, an inconstant element (Figures 5 and 6).

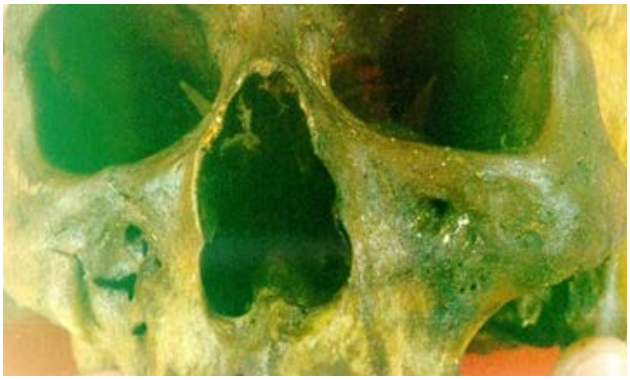

Figure 5 - Right infraorbital foramen lower than the left one; both foramens are at distance from the infraorbital margin

Figure 6 - Intermaxillary suture deviated to the right and slightly irregular, up to the inferior margin of the alveolar process; unequal infraorbital foramens; double left infraorbital foramen; prominent right canine bossa; shallow infraorbital and canine fossae; oval, deep myrtiform fossae

The infraorbital fossa is tightly correlated with the volume of the maxilla: on a voluminous maxilla is relatively less concave horizontally, on an average maxilla the fossa is deep and on a smaller maxilla, the infraorbital fossa is shallower.

The infraorbital foramen (Foramen infraorbitale) was circular in equal proportions (in 1/2 of the cases), with a diameter of 2.5-5 mm, or oval, with 3-5 mm vertical axis and 1.5-3 mm horizontal axis. Note the difference of shape within the same skull: circular on the left and oval on the right (most frequent case) or vice versa. It also is frequently unequal in size, usually being larger on the right. The foramen is located at a variable distance from the infraorbital margin, being lower on the left in 65% of cases. On the right side is located at 0.5 to 1.1 cm from the margin while on the left is at 0.6-0.9 cm. So, a greater variability is noted on the right. Compared to the piriform aperture, the infraorbital foramen is located at 0.9 to 1.7 cm on the right and 1.2-1.7 cm on the left at. We encountered five cases of infraorbital double foramen, an aspect quoted also by [12,13] (Figures 1 and 4).

The intermaxillary suture is vertical and perpendicular in only 35% of cases. In other cases it is deviated to the left in 40% of cases, and in 25% of the cases is oriented to the right. The degree of inclination is variable, making with the horizontal an angle of 95-1100.

The alveolar process (Procesus alveolaris) is wider posteriorly. There is a difference in right-to-left width, being wider on the right side in 40% of cases (6-13 mm), same size on both sides in 30% of cases and larger on the left in the other 30% of cases. The posterior opening of the alveolar border is 3.4 to 4 cm. The most evident alveolar prominences are, in order of frequency, those of canines, incisors, premolars and molars 1 and 2.

The zygomatic process (Procesus zygomaticus) may be sharp or, more frequently, with a serrated or rounded edge and with a small tubercle in almost 50% of cases.

Conclusions

Considering the central position of the maxillae within the face, they would have to be perfectly symmetrical bones. This is not done, noting frequent asymmetry, particularly common in the piriform aperture but also asymmetry due to different sizes of maxillae as a whole. These asymmetries are also imposed by the different prominence, more or less exaggerated, of the anterior face of the maxillae and of the inferior orbital margin. The bony asymmetries are likely attenuated or even canceled by the arrangement of the soft tissues.

Among the anatomical landmarks that we described, some particular may be considered: the duplication of the infraorbital foramen (especially of the left maxilla) and canine fossa peculiarities related to the infraorbital fossa.

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 84 - 90
DOI: 10.2478/arsm-2013-0015

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Financial management within the health system

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ABSTRACT
The financial management within the medical management plays a very important role considering the fact that health care costs a lot of money. The health care system is greatly influenced by the allocated funds so that there are types of health care systems depending on the allocation and collection of funds and depending on the payments of the services providers. There are several mechanisms for financing the health care system of which the most important are represented by the state budget funding and voluntary health insurance. In terms of financial management, is a reform within the Romanian health care system mainly focused on reducing the number of hospitals and restructuring the County Health Houses.

Keywords: financial management, health system, insurance system

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Introduction

In the last 20-25 years, within the scientific and specialist literature problems concerning the organization, administration and management of non-commercial organizations in general, and in particular those who provide services were highlighted and discussed. Therefore to have an efficient management, the healthcare organizations must be known and understood, and the mechanisms underlying their operation should be harmonized with the regulatory framework, with the ways of human resources selection and motivation and other features of the external environment, with impact on organizations.

It would be good if the medical management will become a part of the national management certainly with democratic economic changes towards a market economy and healthcare market. We believe that medical management is part of the general management, thus been respected and used principles and methods of classical management, taking into

account the particularities of the health system.

Regarding the health system management objective premises have appeared which cross the administrative style of command to the democratic style. Gradually, it is formed the healthcare market and its infrastructure.

These changes require the emergence of new specialties in medicine and public health and especially a medical manager.

The medical manager should be familiar with marketing problems, the medical and pharmaceutical market research, should know the relationship bid / offer, the pricing process of providing services and medical goods. A separate section is the knowledge of medical legislation, the labor code, tax laws, taxes, etc.

Qualitative and quantitative structure of the population healthcare is determined by its request. Choosing the method of treatment depends on the doctor who usually is not interested in the economic consequences of its activity.

The liability for economic status lies on the administration of the medical institution. To efficiently lead, the manager must be familiar with methods of management. Application of systematic analysis within the health care institutions was justified in the past and in the present. The system is a structure in which it is periodically introduced material, energetic, information factors etc..

The second part of the system is the operations and processes which are subject to business factors, components or materials introduced into the system. Thus, if the system input (curative institution) is the patient, towards him it is taken a series of actions (operations) by the medical personnel.

The factors entered into the system are called input conditions, which are considered by the actions of revolt (signals, stimulus) or consumer factors and output of the system are called output measures or final product, namely healthcare provision.

Income funds of the health care systems

The healthcare services, unlike other services, are required by a large number of people, but, in generally, health care costs a lot of money.

If every individual should be left free to decide on their healthcare consumption and pay for it, the medical supplies would be very different from one individual to another, with equal conditions of disease, depending on the ability to pay for them. Due to reasons of equity, in most countries there is a national health policy that sets out how to make access to health care consumption and who bear the expenses derived.

The health financing schemes, whether public or private, affects the state budget, the cost of production factor, the labor and, hence, the employment, the imports, the exports and the competitiveness of a country.

The funding mechanism is the needed instrument in order to implement this policy.

This mechanism includes:

- The collection of resources for the payment of health care;
- Their allocation (regional or by different health care providers);
- Payment of inputs (in particular, medical and health).

Collecting funds intended for health services

This issue refers to the way in which the financial resources can be collected for payment of medical services. Financial resources may be collected in several ways:

- By direct payment of the services by the patients;
- Voluntary contributions to facultative health insurance;

- The social contributions paid by employees and economic agents;
- Budgetary resources;
- By setting up deposits with special destination to health;

The way of raising funds is determined by the typology of health systems. Thus we may meet:

- National health systems financed from the state budget;
- Social security schemes financed by mandatory contributions to health insurance;
- Private insurance systems financed by voluntary insurance premiums;
- Free market systems financed by direct payment made by the consumer

The allocation of funds to health care providers

The financial resources are directly allocated to the health healthcare sectors (primary, secondary and tertiary) and to health care providers (hospitals, dispensaries, clinics, private practices).

Allocation to regions can be made on historical base or based on an allocation formula that takes into account the needs of the population in a given region, and the allocation to assistance sector is made based on the health policy objectives. At the microeconomic level, the allocation takes place based on the criteria by which the funds are granted to the health care providers.

The mechanism of funds allocation to providers includes:

- Prepay by anticipated casuistry (payment is given for each treated case, according to a predetermined cost).
- Budget of expenditure categories (principal elements volume is determined by expenditure: personnel, medicines, food).
- Overall budget (it is allocated a global sum to achieve a predetermined volume of activity).
- Budget of practice (a group of general doctors can obtain a budget for providing medical assistance to a certain number of patients).

The payment of the production factors

The mode of remuneration of medical personnel can be diverse. If the medical staff, in general, is remunerated by salary, doctors may be remunerated by several ways:

- The salary payment per service (for each service shall be fixed a rate or a score, which then turns into monetary equivalent);
- Payment per capita (for each patient cared during a period, it receives a tariff score);
- Payment according to a relative value scale (each doctor is paid according to its position occupied in a relative value scale, established on the basis of years of training, specialty difficulty, risk and cost of practice).

The mode of payment of doctors affects the total cost of health care. It was noted that countries using payment per service, as a payment method experienced a large increase of health costs. Choosing a particular payment mechanism is a compromise between the interests of doctors (who prefer a certain kind of payment) and government interests (which aims to limit costs).

The combination of the three funding aspects is different from one healthcare system to another. In a private system, the consumer pays the cost of health services in place, overlapping the resources generation with their allocation and providers payment. However, most often we are faced with a combination of two or three aspects of the remuneration of medical personnel.

State intervenes, most often, in resource generation (in case of funding from the state budget

or insurance), but is also present in their allocation, establishing rules for the remuneration of production factors.

Mechanisms of financing the health care system. Worldwide practices

The health systems of European Union countries are very different from each other, even for developed countries. There are also large differences in the level of resources allocation in this field and in the health status, both between countries with similar development levels as well as in the same state. The common key feature to all health systems is concerning the political factors regarding the accelerated growth of costs and sustained awareness concerning their control trough streamlining processes and improving outcomes, including the increase satisfaction both of the patient and medical staff.

Health care systems can be funded from multiple sources, both public and private. Funds collected from these sources can be managed by public institutions (ministries, public insurance funds) and private (private house insurance, employers' organizations and trade unions, non-profit organizations) and can be spent on medical services for public and private institutions.

We will further analyze financing arrangements. Revenue accruing from:

1) the taxes collected from the state budget;
2) facultative health insurance;
3) health insurance;
4) direct payment of patients.

For choosing between different ways of financing the health system, criteria to rank them according to the achieved performance are necessary.

The main criteria aimed for the sustainability and revenue generation, efficiency and the level of medical services, the health status evolution are:

1) Revenue generation
2) Provision of services
3) Health Status

Financing from the he State Budget

Health financing from budgetary sources are a feature of health systems such as "national health system". Such systems exists in countries like UK, Italy, Spain, and Denmark

The assessment criteria:

- Economic efficiency: the tax system should not interfere with the efficient allocation of resources.
- Fairness: the tax system should treat all individuals equally.
- Easy management: the tax system should be run easily and inexpensively.

Economic efficiency

Whenever the government uses progressive or proportional taxation to get income from the private sector, there is an economic cost that decreases the effectiveness of the revenue collected. This additional cost is known as the cost of efficiency or excess burden of taxation.

Taxes distort the firm's decisions in connection with the production, exchange and investment and consumer decisions in relation to the consumption and savings.

Branches taxpayers will face an increase in costs and will reduce the production of goods taxed and increase their price corresponding to the situation where there would not be taxes. Consumers will respond to higher prices by reducing consumption. The result is suboptimal because only part of the consumer and producer surplus is collected by the state, and by the inhibitory effect on the production, part of the excess is lost. From an economic perspective, it should be deducted from the resources collected through taxes.

Here fits the taxes or fixed amount duties, such as stamp duty, local taxes, sanitation taxes etc. Most

taxes are dependent on the level of production or the sales or revenue, so are generating cost efficiency. They are used, in spite of a positive economic argument, as they can ensure the principles of fairness.

This explains the chronic insufficiency of health financing in Romania: insufficient resources, delays in knowing the availability of the resources for the next year (adopting the budget law was made often in the spring of the current year), the accumulation of large debts during the year due to delays in revenue collecting, allocated revenues congestion from the budget to year-end, when they cannot make expenditures or are no longer meets the criteria of efficiency.

Facultative health insurance

In a facultative insurance scheme, citizens voluntarily opt to pay an insurance premium set according to individual or a group risk. In such countries like the U.S. and Switzerland, private health insurance is the main source of funding contributions curative.

The term "insurance" can be treated in several ways. Insurance can be defined as a mechanism that ensures protection against risks or as an actuarial mechanism. The first defines insurance in terms of objectives, the second – a method by which objectives can be achieved.

Even when we are not talking about a defined insurance, we use the term of insurance, whether it protects individuals against risks (such as social security).

If an individual is a risk adversary, the "uncertainty" may cause negative utility. "Certainty" is the stuff that produces positive marginal utility and for which the individual, a risk opponent, is willing to pay a positive price. The price of insurance (first actuarial insurance) in a market mechanism is given by:

$$P = p \times L + T \quad (1)$$

where: p - the probability of the risk to occur, L - loss caused by the risk size, T - Transaction costs (administrative costs plus normal profit), P - ensuring a competitive market price.

Conditions for the optional insurance:

The probability of an insured event for an individual to be independent of the others.

This condition is necessary because the security is based on the existence, in a period of a predictable number of individuals who win and a predictable number of individuals who lose. If the probabilities would be related, when a person suffers a loss, the same will happen to all the others. This explains why, for example, inflation is not an event that could be insured.

The probability should be smaller than 1.

Otherwise, equation (1) becomes: $P = L + T > L$ (2)

and the first actuarial loss exceeds the insured. In this case, there is no possibility of spreading the risks and no private insurance company will cover such a risk. The chronic or congenital diseases for which no private insurance company o will provide insurance due to the fact that the probability of requiring treatment is almost certainly equal to one.

Insurance houses are most concerned with combating moral hazard. They combat the phenomenon of capping the consumption of medical services and by placing a financial cost to the insured at the time of consumption (medical consumption rate). Even public health systems tend to use such measures obliging the consumer to bear part of the cost. Arguments in favor of establishing the obligation for consumers to bear part of the cost when using services are: 1) awareness of the cost of those services and greater accountability to patients, 2) reducing demand, 3) attracting additional sources in the system

A number of studies on the use of tariffs on consumption have demonstrated the effectiveness of this method is much lower compared to the initial expectations created by the theoretical model. A major experiment, conducted in the U.S. showed that a tariff on the consumption of medical care leads people to give up, in the same measure, to needed services, as well as the unneeded ones.

Because people not have enough information to make rational decisions about medical supplies, it is possible for people to give up more easily to preventive or primary care services, when they have to pay a price for them.

On the other hand, the rates of consumption may be reduced, primarily, the consumption of those individuals who are sensitive affected if they have to pay the price for health care services. It was noted that the imposition of a certain tariff on consumption has a significant impact, particularly on those with low incomes.

Critics argue that using consumption rates, even if this means reducing the unnecessary demand, the individuals who bear, ultimately, the cost of such measures are the truly sick and who indeed need healthcare. The rate on health services consumption becomes a disease tax.

A health system based entirely on facultative insurance does not exist in any country precisely because of the shortcomings noted above. Even in the U.S., where private health insurance is the most developed, 37 million people under 65 years do not have health care insurance (the elderly and poor who receive coverage through two public programs: Medicare and Medicaid are not included) . For people categories that do not want to ensure in a private system, or cannot afford, or are rejected by private companies, most of the times, the state steps to ensure the access to the medical treatments.

Issues previously addressed generate inefficient allocation of resources and inequality and make impossible the operation of a private health insurance market. In such circumstances it is justified the government intervention in the form of public financing, production and organization of social insurance or in the form or private insurance regulation.

In Romania

Currently, the health system is organized on the basis of mandatory social insurance, which is the main mode of financing and is operating under the following principles:

1) free choice of health insurance house;

2) solidarity and subsidiarity in the collection and use of funds;

3) free choice of the service provider;

4) payment of the mandatory participation in health insurance

Going back to present, the current legislation (Law 95/2006) has 800 initial articles and over 1,000 subsequent amendments, so it is impossible to have a minimal coherent considering that on average each article was rewritten again. That legislation failed to address major issues related to quality, cost and accessibility of health care, despite the significant increase of financial resources which have entered into the system. All mechanisms that provided the state with multiple roles such as financier, regulator, owner, service provider, etc. have not been successful.

The new health law has as philosophy strengthening the state's role in limited areas such as control and regulation, introducing regulated competition elements leading to the possibility of increasing the patient's choice depending on the offered services. Its dissatisfaction turns directly into loss of insured people form the private homes, which does not happen in the current system. In principle, the law makes more responsible those who inefficiently spend public funds, the first penalty being the loss of income.

It is necessary to analyze the organizational characteristics and managers in the Romanian health system, this being more important given that the annual funding of the health system is about 4% of GDP, being much lower than some East European countries.

Based on the arguments (too little money allocated to health per capita, health expenditure per capita declined in last few years, from 353 euros

in 2008 to 310 Euro in 2009; for 2012 is estimated 250 euro expenses per capita) is obviously required reform in Romania, but still it is necessary to have any law to be enforced, to be political will.

Moreover, it is trying to increase the amount of contributions by growing the mass of contributors as well by participation of the state budget to pay contributions for certain categories of persons who are currently exempted from the payment. The problem is the application rate of 5.2% paid by the employer will be reported to the average gross salary and will have a great impact on the budgets of companies, whether public or private. We still have an unemployment rate quite high and I do not think that this measure would solve the problems of the healthcare fund. The effect would be the increase of the number of unemployed individuals, so indirect the burden returns to the state because the state will pay the health contributions from the unemployment budget.

The State has proposed for the next two years to restructure hospitals, the health professionals to not have budgetary status so they can negotiate their salary, to reduce the number health county houses which means also a decrease of costs in the system, which will subsequently supposed to change their status in mutual health insurance companies. It remains to be seen to what extent they will be able to meet solvency criteria stipulated by the legislation in force.

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 91 - 98
DOI: 10.2478/arsm-2013-0016

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Sedation in elderly patient undergoing surgery with spinal anesthesia: propofol vs. midazolam

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ABSTRACT

It is widely known the need for a high quality sedation associated with local regional anesthesia in elderly patients' surgery. The aim of this study was to compare two sedation regimes: propofol and midazolam, associated to spinal anesthesia with isobaric 0.5% bupivacaine in lower abdominal surgery in elderly patients. After obtaining the informed consent, 60 patients aged between 65 and 82 years old (ASA I-III), scheduled for unilateral hernioplasty , under spinal anesthesia with isobaric bupivacaine 1,5 ml (0.5%), were randomized into two groups of 30 patients each: P group - patients received propofol 3mg/kg/body/hour in the first 10 minutes and then continuous infusion by injection of 1,8 mg/kg/body/hour, and group M–patients who have received midazolam 0,2mg/kg/body/hour in the first 10 minutes and then continuous infusion by injection of 0,15 mg/kg/body/hour. In order to achieve a similar level of sedation we used 0,1% midazolam infusion and 1% propofol. Intraoperative, the following have been monitored: heart rate and breath, mean arterial pressure, hemoglobin oxygen saturation. We have also recorded the sedation score (modified Wilson sedation scale), awakening times, patient satisfaction at 24 hours (satisfaction score according to Iowa University). The average score of sedation for group P was of 3,24 ± 0,23, compared to 2,64 ±0,42 in group M (p = 0.001). Both drugs reduce blood pressure, but not more than 20% of the initial value. There are no significant differences in the satisfaction score of the patient (p = 0,18). There was just one case of respiratory depression in group M with the decrease of SpO2 at 86%.Sedation with propofol associated with local regional anesthesia techniques in elderly patients seems to provide better conditions in terms of sedation score and lack of respiratory depression compared with the administration of midazolam. Recovery was significantly faster after sedation with propofol. The satisfaction score of the patient was similar in the two groups.

Keywords: propofol, midazolam, spinal anesthesia, elderly patients

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Introduction

Defining sedation as "a state of calm and tranquility" induced by medication known to have sedative effect, Johan Raeder has recently conducted a relevant analysis of various situations experienced by the patient and the physician to determine the optimal degree of sedation required for each patient, without being able to give the ideal recipe for sedation.

The need to associate a high quality, secure and fast elimination sedation, it is widely known for regional anesthesia. The way in which people have tried to achieve this goal has changed over the time, using different classes of drug.

In recent years, the use of propofol or midazolam for sedation has gained popularity, in combination with local regional anesthesia techniques and for diagnostic or therapeutic maneuvers. Despite the numerous advantages of these drugs (hemodynamic stability, rapid awakening, reduced incidence of postoperative nausea and vomiting) persists the disadvantage of respiratory depression, hypotension and/or bradycardia in their overdose.

The aim of this study was to see whether the administration of sedative doses of propofol, respectively of midazolam (iv.), both associated to spinal anesthesia with isobaric 0.5% bupivacaine in lower abdominal surgery in elderly patients: a) suppresses anxiety during surgery in elderly patients; b) determines changes in the hemodynamic behavior; c) depresses breathing changing pulse oximetry; d) there are differences in the level of sedation; e) there are differences in the awaking times and satisfaction in 24 hours.

Material and method

During the period February 1st, 2012 – September 1st, 2012 we have included 60 elderly patients proposed for surgery (unilateral hernioplasty), under spinal anesthesia with 1.5 ml 0,5% isobaric bupivacaine in a prospective randomized observational study approved by the Ethics Committee of the County Emergency Hospital Constanta.

The study was conducted in accordance with the principles of the Declaration of Helsinki.

The criteria for inclusion of patients in the study were: age over 65 years old; ASA I– III; scheduled abdominal surgery (unilateral hernioplasty); normal preoperative mental state, defined by the score ≥ 8 at the AMT adapted test (Abbreviated Mental Test - Table I); absence of contraindications for spinal anesthesia (clinical or laboratory), no allergy to egg, soya or lidocaine, absence of extreme malnutrition and cerebrovascular inefficiency.

*Table I. Abbreviated Mental Test (AMT) **

Age
Hour
Year
Hospital name
Hospital address
Recognition of two persons (eg doctor, nurse)
Date of birth
Year of commencement of World War
Name of the president
To count backwards from 20 to 1

** Patients were asked to answer these 10 questions. Each correct answer received one point.*

The day before surgery, during the pre-anesthetic consultation, patients were informed about the study protocol, they have filled in the sheet with psychological, pathological and personal data as well as the informed consent.

On the day of the surgery, patients were infused with 500 ml saline preoperative (8-10 ml/kg/body) and intraoperative with 250 ml saline (4 -5 ml/kg/body), followed by 250 ml colloidal solution of Voluven 6% (4 - 5 ml/kg/body).

All patients were anesthetized in the same conditions: spinal anesthesia, needle 22 G, median approach, space L2 – L3, seated position, 1.5 ml isobaric bupivacaine solution 0,5%.

Patients included in the study were randomly distributed by the method of random number lists, into two groups as follows: group P (n= 30), patients who received sedation with propofol and group M (n = 30), patients who were administered midazolam for intraoperative sedation.

Previous studies have shown that the average infusion rate of 3.7 mg/kg/body/hour for propofol and 0.27 mg/kg/body/hour for midazolam provide similar levels, for a satisfactory sedation in the young patient.

Given the particularities in elderly patients and aiming to ensure quality sedation with minimal risks, we have reduces the administered doses, as follows:

-group P: patients have received propofol 3mg/kg/body/hour in the first 10 minutes and then continuous infusion on auto injector 1,8 mg/kg/body/hour,

-group M: patients have received midazolam 0.2mg/kg/body/hour in the first 10 minutes and then then continuous infusion on auto injector 0.15 mg/kg/body/hour.

In order to achieve a similar level of sedation, midazolam infusion of 0.1% and respectively propofol 1% has been used. We have started the injectomat infusion immediately after spinal anesthesia.

Intraoperative, the following were monitored: breathing rate, mean arterial pressure at 3 minutes, continuous heart rate (HR) as well as ECG (DII) and hemoglobin oxygen saturation (SpO2).

We have recorded the sedation score obtained on the modified Wilson sedation scale (Table II) subsequently measured at 5 and 10 minutes after the interruption of the sedative medication. We have recorded the time intervals needed for eyes opening and replay psycho-cognitive functions assessed by the patient's ability to open his/her eyes upon command and to correctly pronounce the date and place of birth.

The appearance of respiratory depression has been followed (decreased respiratory rate below 10 breaths/min or decrease of SpO2 below 90%).

Table II. Modified Wilson Sedation Scale

Score	Description
1	Fully awake and oriented
2	Eyes closed but rousable to command
3	Eyes closed but rousable to mild physical stimulation (earlobe tug)
4	Eyes closed but unrousable to mild physical Simulation

Evolution of hemodynamic was assessed by a very good, good and unsatisfactory score. (Table III).

Table III. Assessment of hemodynamic behavior intraoperative

Evolution of hemodynamics	Definition	Score
Unsatisfactory	MAP decreased by more than 25% of the preoperative value over 20 mg ephedrine 1% required	1 point
Good	MAP decreased by up to 25% of the preoperative value up to 20 mg ephedrine 1% required	2 points
Very good	MAP decreased by up to 20% of the preoperative value does not require ephedrine 1%	3 points

Anxiety, as state of physical and mental sickness, was estimated according to three categories of symptoms: movement disorders, autonomic disorders, vigilance disorders, evaluated before surgery, during surgery and after awakening for hypnosis.

Patient satisfaction was recorded in a questionnaire with eight questions of interest satisfaction (items) (satisfaction score after Iowa University, Table IV), which the patient was asked to complete at 24 hours post-surgery. Each item of the questionnaire has received a score from 1 to 6, and subsequently patient satisfaction score was calculated as the arithmetic average of the eight scores.

After the surgery, patients were supervised and monitored in terms of hemodynamic, cardiac and respiratory values for 24 hours, by trained personnel, noting in particular: incidence of nausea, vomiting, excessive sedation, respiratory depression.

Parametric variables, were expressed as the average ± DS (deviation standard) and for their comparison the t – Student test has been used. For non-parametric variables the Mann-Whitny test has been used. The values $p<0.05$ were considered significant.

Table IV. Satisfaction score after Iowa University

1. I threw up or felt like throwing up • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6	1. I felt pain • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6
2. I would want to have the same anesthetic again • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6	2. I felt safe • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6
3. I itched • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6	3. I was too cold or hot • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6
4. I felt relaxed • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6	4. I was satisfied with my anesthetic care • Disagree very much+1 • Disagree moderately+2 • Disagree slightly+3 • Agree slightly+4 • Agree moderately+5 • Agree very much+6

Results

There are no significant differences between the demographic data of the two groups of study, being considered homogenous (Table V).

Installation time of hypnosis (level 3 of sedation on the 4 steps Wilson scale) was late in the midazolam group, but without significant statistic differences (Table VI).

Table V.Patient demographic data and clinical characteristics

	Group M (midazolam) (n = 30)	Group P (propofol) (n = 30)	p
Age(yrs)	72,9±9,1	74,55±6,7	0,58
Weight (kg)	63,8±11,6	67,5±8,2	0,78
Height (cm)	163,4±14,1	167,4±15,8	0,11
Sex(M/F)	24/6	21/9	0,57
ASA class I/II/III	8/14/8	6/15/9	0,61

The data are presented as the mean ± SD or the number p > 0.05

Table VI. Installation time of hypnosis

	Group M (midazolam) (n = 30)	Group P (propofol) (n = 30)	p
Time (min.)	**9±3**	**7±2**	**0,058**

The data are presented as the mean ± SD , p > 0.05

During surgery, within the midazolam group, 26 patients were placed on level 3 of sedation and 4 patients on level 4, while in the group with propofol, 28 patients achieved level 3 of sedation and 2 patients level 4; 5 minutes after discontinuation of sedative medication in the propofol group, 25 patients were placed on level 2 on Wilson scale and 5 patients on level 3, while in the midazolam group, 19 patients remained on level 3 and for 11 patients sedation became superficial on level 2 Wilson scale. After 10 minutes, 16 patients sedated with midazolam reached level 1 and 12 patients level 2, while all the patients with propofol were on level 1 of sedation (Table VII, Figure 1.).

Table VII. Level of sedation on the 4 steps Wilson scale

Level of sedation	**Group M(midazolam) (n = 30)**			**Group P(propofol) (n = 30)**		
	During surgery	5 minutes after discontinuation of sedative medication	10minutes after discontinuation of sedative medication	During surgery	5 minutes after discontinuation of sedative medication	10 minutes after discontinuation of sedative medication
1.	-	-	16(53,3%)	-	-	30(100%)
2.	-	11(36,6%)	12(40%)	-	25(83,3%)	-
3.	26(86,6%)	19(63,3%)	2(6,6%)	28(93,3%)	5(16,6%)	-
4.	4(13,3%)	-	-	2(6,6%)	-	-

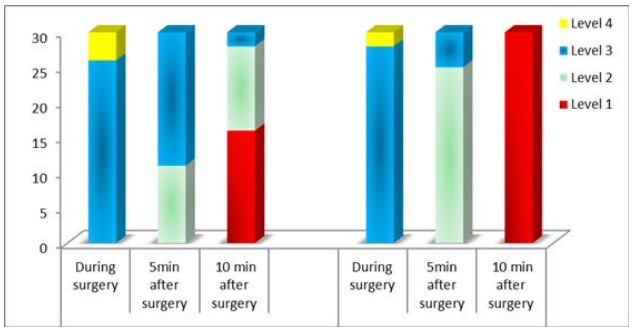

Figure 1 - Differences in the level of sedation on the Wilson scale

Recovery time of consciousness confirmed by eye opening and obtaining a coherent response on age, date and place of birth was significantly longer in the group of patients sedated with midazolam (Table VIII).

Table VIII. Recovery time of consciousness

	Group M (midazolam) (n = 30)	**Group P (propofol) (n = 30)**	**p**
eye opening (minute)	11±3	4±2	0,028
coherent response on age, date and place of birth (minute)	12±2	5±1	0,042

The data are presented as the mean ± SD p<0.05

Until sedative medication, all patients had one or more symptoms of anxiety suppressed by the administration of sedatives without significant differences between the two groups. Patients had a high degree of satisfaction regardless of the study group they had been part of. (Table IX).

Table IX. Patient satisfaction at 24 hours (satisfaction score according to Iowa University).

	Group M(midazolam) (n = 30)	**Group P (propofol) (n = 30)**
Fair/poor	-	-
Good	4	-
Excellent	26	30
Satisfaction score	3,24±0,23	2,64±0,42

Intra-surgically, hemodynamic was stable, the evolution of the patients enrolled in the study being assessed as very good. TAM decrease did not exceed 20% of the pre-anesthetic value, although it was more obvious in the case of sedation with midazolam (Table X).

Table X. Evolution of clinical behavior during surgery

Parameters	**Grup M(midazolam) (n = 30)**	**Grup P(propofol) (n = 30)**
HR(bpm)	80,9 ±12,4	79,6± 13,5
TAM(mm Hg)	83 ±12,3	78,5±4 7,8
SpO2(%)	98 ±0,6	99,1± 0,7

The data are presented as the mean ± SD p>0.05

There was only one case of respiratory depression in group M, with desaturation up to 88% and slow breathing of 6 breaths/minute, when the patient was assisted breathing through the mask ventilation for 3 minutes, after which respiration became efficient and saturation returned to 99%. Administration of midazolam was reduced at 0.1 mg/ kg body/hour.

Discussions

Given the high incidence of associated diseases and reduced psychological resilience in the elderly, spinal anesthesia was preferred in geriatric surgery on the lower abdomen. Simpathicolysis and arterial hypotension can be reduced or avoided by using small doses of local anesthetic. The dose of bupivacaine recommended in specialized literature, 15-20 mg (3-4 ml solution 0.5 %) is too high for elderly patients.

Local anesthetic dose reduction has a beneficial effect on hemodynamic, but in the same time the quality and duration of sensory block is lost when it exceeds a certain lower limit of the amount on the quantity of anesthetic administered. In these circumstances, the association of intravenous sedative medication can bring more quality to the local regional anesthesia due to its sedative and anxiolytic effect.

In this study we have administered intravenously slow sedative doses of midazolam 0.15 mg/kg body/hour or propofol 1.8 mg/kg body/hour in elderly patients undergoing spinal anesthesia with 0.5% (7.5 mg) bupivacaine.

Slow infusion of midazolam and propofol as adjuncts for spinal anesthesia, proposed an excellent and easily controllable sedation. Within the interval of 13 – 15 minutes most patients have achieved level 3 of sedation: sleeping, as an immediate response to physical stimulation (slight tapping of the scalp) without significant difference in the two groups.

The incidence of side effects was slow. In both groups we have found a slight decrease in TAM that did not exceed by 20% the pre-anesthetic value. Also heart rate was dropped by more than 5-7 beats/minute.

The only difference between the two groups was the different recovery time of the consciousness state. The average time from discontinuous infusion and until the patient opened his/her eyes and gave information on the date of birth was significantly shorter in patients from the group sedated with propofol (3-4 minutes compared to 10-11 minutes).

In the group sedated with propofol awakening was quiet, prompt without residual sedation, compared to the group which received midazolam, where a mild sedation persisted for 30-60 minutes, sedation associated with amnesia.

In the specialized literature, both intravenous anesthetics were used as processing of regional anesthesia. Among benzodiazepine, midazolam is the most frequently used for intravenous sedation having a fast debut of the effect and a short elimination hart-life (2-4 hours). An important advantage of midazolam as adjunct to regional anesthesia is sedation associated with the effect of sedation and low incidence of side effects. However, being administered for long periods of time or in large doses than 2.5 mg/kg, midazolam delays the awakening of the patient.

Propofol has a pharmacokinetic profile characterized by a fast redistribution and high clearance which allows fast recovery from the sedative-hypnotic effects. Also, post-surgery side effects are rare, especially nausea and vomiting.

Many researchers have compared propofol to midazolam for the sedation during local and regional anesthesia. In the study drawn up by Wilson et al., 3.7 mg/kg body/hour propofol and 0.27 mg/kg body/hour midazolam have caused similar sedation levels during the subarachnoid anesthesia in young adults, but a significantly more rapid recovery after discontinuation of propofol. The titration of sedative infusion was easier with propofol, compared to midazolam and the risk of excessive sedation was reduced.

In our study we have not observed significant statistic differences between the two groups on the decrease of intra-anesthetic of TA.

Conclusions

In conclusion, the two intravenous anesthetics, midazolam (dose of 0.15 mg/kg body/hour) and propofol (1.8 mg/kg body/hour), when administered to elderly patients under spinal anesthesia with 7.5 mg bupivacaine 0.5%, have given comparable levels of sedation and they have presented cardiovascular

and respiratory stability. Propofol provided a pleasant awakening without residual sedation and superior patient recovery lucidity present after 3 -5 minutes prior discontinuous of administration.

Anxiety and unpleasant intraoperative sensations were absent, nausea and vomiting were absent, while post-surgery delirium (clinically manifested by psychomotor agitation, potentially self-traumatizing: fall out, plucking catheter, uprooting venous catheters) was not observed in any patient.

The novelty of our study is the significant reduction in the dosage of sedatives used in accordance with the characteristics of elderly patients, maintaining a balance between the expected benefits and potential risk of side effects. A correct hydration of elderly patients and their proper monitoring had a considerable contribution in obtaining these results.

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 99 - 102
DOI: 10.2478/arsm-2013-0017

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Cervical root resorption - case report -

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ABSTRACT
Cervical resorption is an inflammatory-mediated external resorption of the root, which can be seen after trauma and following internal bleaching techniques. It is initiated in the periodontal ligament, but the exact pathogenesis is not known. Once triggered the resorption phenomenon can lead to fracture and loss of the tooth.

Keywords: cervical external root resorption; internal dental bleaching; tooth fracture; extraction.

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Introduction

Dental resorption is also called root resorption. It is a physiological destructive process in deciduous teeth, allowing eruption of permanent teeth but it is a pathological phenomenon in permanent teeth, which induces the disappearance of hard tissues like dentin, cementum and bone. Etiopathogenesis of dental resorption is related to injury or irritation of the dental pulp or periodontal structures through: trauma or excessive pressure, mechanical stimulation (orthodontic movements), inflammatory or infectious conditions (bacteria from periodontal disease), internal teeth whitening, systemic disease or idiopathic causes [8]. Root resorption in permanent teeth can be internal and external, the latter being more common. Cervical (periodontal) inflammatory resorption or invasive cervical resorption, extracanal invasive resorption, cervical root resorption, and cervical inflammatory resorption are terms used to describe this form of external resorption [1,7]. Although the exact etiology has not been established,

the authors grouped this condition with inflammatory resorptive conditions. Inflammatory cervical external root resorption is initiated in the periodontal ligament and occurs in the cervical area of the tooth.

The exact pathogenesis is not known.. Dental resorption process is similar with the bone resorption, the clasts cells are the dominant histologic element. They cause degradation of the crystalline structure and the structure of the organic component of hydroxyapatite (type I collagen). The problem is usually asymptomatic and discovered on routine X-rays examinations [6,9]. The cervical resorption lesions may develop above the crestal bone (supraosseous) or below the crestal bone (intraosseous).

Case report

A female patient, 35 years old, has presented in our dental practice for dental treatment. We noticed the discoloration in her upper right lateral incisor (Figure 1). The tooth has presented a distal massive incorrect filling. The information the patient has provided revealed the fact that the tooth had been endodontically treated due to caries in the childhood. No history of trauma was reported. Ten years ago, after the endodontic treatment, the tooth was internally bleached by sodium perborate and hydrogen peroxide. Due to an unsatisfactory bleaching result after a number of sessions, the treatment was supplemented with in-office bleaching. The radiographic exam confirmed the endodontic treatment. The X- rays exam also revealed an important cervical root resorption in association with periodontal sockets and bone resorption.

Figure 1 - Clinical view of the right upper lateral incisor showing discoloration

The aspect of cervical inflammatory resorption appears as a radiolucency superimposed over the root canal (Figure 2).

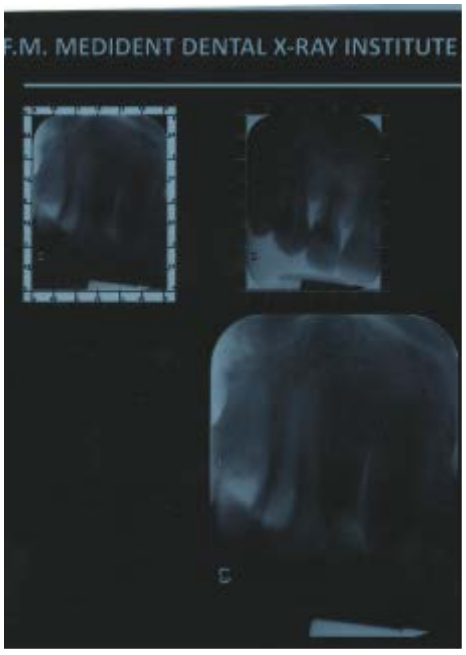

Figure 2 - Initial intraoral radiograph showing large cervical resorption

We have informed the patient about the situation and offered her methods of treatment, but she accepted no treatment for the condition of her

right upper lateral incisor. After 6 months the patient has presented to the dental office again for the fracture of the tooth (Figure 3).

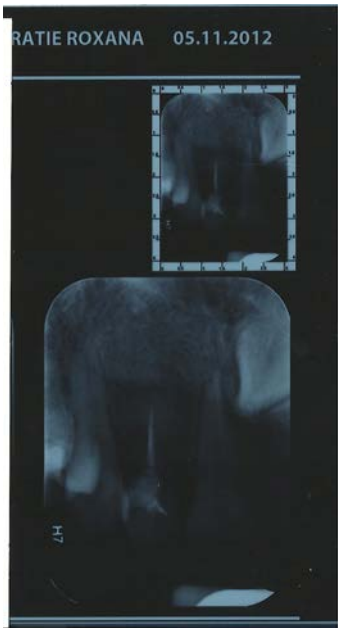

Figure 3 - Radiographic view of the fractured tooth

The fracture was incomplete but the bone condition and the root situation imposed the tooth extraction (Figures 4 and 5).

Figure 4 - Clinical view of the fractured tooth

The treatment of the absence of upper lateral incisor is mandatory for patient for aesthetic and functional reasons. The patient was given three options to replace her missing teeth: a dental implant, a three unit bridge and a partial denture. The patient refused the dental implant because of financial reasons and the length of the treatment. The only option she has accepted was a dental bridge, although the classical treatment with a permanently bridge anchored on adjacent teeth: canine and central incisor involves an obvious massive sacrifice of healthy tooth substance.

Figure 5 - Extracted tooth

Discussion

Several theories have been issued regarding the pathological mechanism of cervical resorption after intracoronal bleaching, especially in combination with heating [5]. Because the underlying mechanism for this effect is unclear it has been suggested that the bleaching agent reaches the periodontal tissue through the dentinal tubules and initiates an inflammatory reaction; another theory suggest that the bleaching agent, the peroxide, by diffusing through the dentinal tubules, denatures the dentin, which then becomes an immunologically different tissue and is attacked as a foreign body. In any case, cervical external resorption is treatable and can be resolved as long as it is caught early enough [2,10].

In the presented case the extent of the resorption lesion along with massive filling have created the conditions for the tooth fracture. But the patient's lack of interest in dental treatment has determined the outcome: loose of the tooth. What is important for patient is that cervical external resorption is treatable if the root destruction is not very extended. It is very difficult to treat when it is associated with large fillings which can weaken the tooth, like this case. Bleaching agents used in association with heat also reduces the hardness of the hard tissues like dentin and enamel. The accessibility to the cervical root lesion also influence the chances for treatment, the supraosseous lesions are easier to treat [3,4]. The lesions can be restored with glass inonomer cement. The condition is to detect the root resorption as earlier as possible; otherwise the only option is extraction.

Conclusions

Cervical root resorption is a pathologic consequence of different factors, including intracoronal bleaching techniques. It can be successfully treated as long as it is detected as earlier as it is possible by the means of x-rays exam. Otherwise the prognosis is tooth fracture and extraction.

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 103 - 106
DOI: 10.2478/arsm-2013-0018

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Indirect effects of noise exposure on liver activity

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ABSTRACT
We live in a noisy world. We constantly undergoing in various types of noise that affect our quality of life. It is well known that noise is not only a problem but also a serious threat to health. The effects, that noise exposure has on health is a public serious problem, and is becoming more acute, which can occur at both, mentally and physically levels.

Keywords: health, exposure, noise, life

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Introduction

Gamma-glutamyltransferase (GGT), also named gamma-glutamyltranspeptidase, is an enzyme present in liver and bile duct which is the most sensitive indicator of hepatobiliary diseases.

Due to a high negative predictive value for these diseases the measurement of gamma-GT is widely used to rule out a hepatic or biliary origin [1,2].

Alkaline phosphatase (ALP), hydrolytic enzyme acting optimally at alkaline pH, exists in blood in numerous distinct forms which originate mainly from bone and liver, but also from other tissues as kidney, placenta, testes, thymus, lung and tumors.

Physiological increases are found during bone growth in childhood and in pregnancy, while pathological increases are largely associated with hepatobiliary and bone diseases.

In hepatobiliary disease they indicate obstruction of the bile ducts as in cholecystitis caused by gall stones, tumors or inflammation.

Elevated activities are also observed in infectious hepatitis. In bone diseases elevated ALP activities are originate from increased osteoblastic activity, as in Paget's disease, bone metastases and hyperparathyroidism [3,4].

A stressor is a chemical or biological agent, environmental condition (elevated sound levels), external stimulus or an event that causes stress to biological organism [5].

Stressors have physical, chemical and mental responses inside of the body, and may also affect mental function and performance [6,7].

The aims of our studies are to determine how acute and chronic auditory stress change the values of ALP and GGT

Materials and method

Experimental animals used in our model were albino rats of Wistar line, males aged 14 weeks and weighing 200-220 g. that were cared for, in compliance with the rules of hygiene, food and accommodation required by Community legislation [8].

The experimental model consists of five groups, whose characteristics are:

- Control group (M) - animals in this group were not exposed to noise, serving as a reference for the experimental groups.

- Experimental group (E1) - animals in this group were exposed only once to noise (38 ± 2 dB) for one hour, three minutes exposure, 3 minute break

- Experimental group (E2) - animals in this group were exposed only once to noise (38 ± 2 dB) for 2 hours, 3 minutes exposure, 3 minute break

- Experimental group (E1-7) - animals in this group were exposed to a cycle of exposure to noise (38 ± 2 db) which lasted seven days, for an hour, 3 minutes exposure, 3 minute break.

- Experimental group (E2-7) - animals in this group were exposed to a cycle of exposure to noise (38 ± 2 db) which lasted 7 days, 2 hours, 3 minutes exposure, 3 minute break.

After noise exposure, blood samples were taken.

It was monitored the activity of the following parameters: Alkaline phosphatase (ALP) and Gamma Glutamyltransferase (GGT), using a spectrophotometer CECIL CE 2012, 2000 Series, which is 1 cm tank.

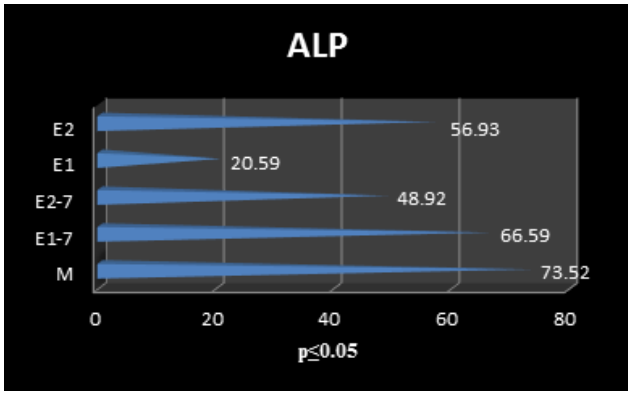
Data were statistically analyzed using the usual methods, and calculate test "t" of Student [9] was to determine the significance of difference between the averages that was compared.

Results and discussions

Table I - The mean ALP values, for the control group and experimental group, after a single exposure for one hour or two hours, and after repeated exposure for 7 days

ALP	X	P≤
M	73.52	
E1-7	66.59	SI*
E2-7	48.92	0.05
E1	20.59	0.01
E2	56.93	0.05

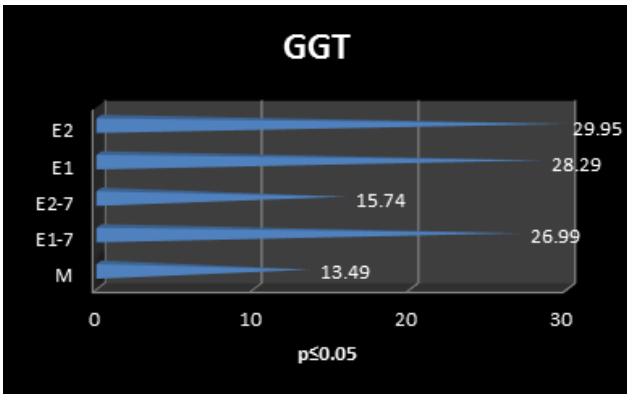
*(*Statistically Insignificant)*



Graph 1 - Graphic variation of the values displayed in table 1

Table II - The mean GGT values, for the control group and experimental group, after a single exposure for one hour or two hours, and after repeated exposure for 7 days

GGT	X	P≤
M	13.49	
E1-7	26.99	0.01
E2-7	15.74	0.05
E1	28.29	0.01
E2	29.95	0.01



Graph 2 - Graphic variation of the values displayed in table II

In this study, animals were exposed to a noise source with a constant intensity of 38 ± 2 db, but different time of period, depending on selected groups.

Sound intensity is located in the limit of audibility of Wistar rats, which can produce physiological changes. This intensity is equivalent to a value of 138 ± 2 db, which is the threshold level of audibility to people.

The exposure of a biological organism to a noise source produces a change in the activity of the hypothalamic-pituitary axis resulting a change in the activity of each organ. Because of this, indirect changes occur in the liver function.

The indirect signs of liver damages are the changes in ALP secretion. This change is present in table number 1, representing the statistically modified values of the ALP with a value of p≤0.05.

But, the single modified value of ALP does not indicate an indirect liver injury. According to the latest specialized studies, to show the indirect signs of liver damages, the values of GGT must be modified, also.

The graphic number 2 contains the statistically modified values of GGT, having a p≤0.05

Beside the fact that the serum transaminases represent the main indicators of the liver activity, it looks like ALP changes can suggest liver damage, also.

Conclusion

1. Acoustic stress that we face every day is an important factor for liver and gallbladder damages.
2. We can consider that liver is suffering if the ALP values are changed, but only if is accompanied with changes of GGT values.
3. Due to the biological similarity between laboratory rats and humans, we can say that these changes may be present in humans.
4. Acute and chronic exposure of humans to daily noise can induce pathological changes of liver activity

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VERSITA

ARS Medica Tomitana - 2013; 2(73): 107 - 111
DOI: 10.2478/arsm-2013-0019

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The evolution of pain in knee osteoarthiritis treatment with sodium hyaluronate

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ABSTRACT
Although the knee osteoarthritis is often benign, severe degenerative modifications can determine serious malfunction. In joints affected by arthritic processes, Sodium hyaluronate is found in reduced concentrations, the normal articular cartilage being replaced by fibrocartilage [6].
The present concepts suggest that osteoarthritis is not a predictable stage in ageing and prophylactic and therapeutic approaches could be taken in the future.

Keywords: osteoarthritis, pain, condro protective.

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Introduction

Of all the degenerative diseases, osteoarthritis (OA) is the most frequent cause of articular paint and discomfort in western countries, including the USA and Great Britain [1,2], OA having great impact on the individual's good functioning, daily activity and work in society [4].

Knee OA is the main cause of malfunction in aged people in the USA [2]; compared to other joints affected by the disease, the knee OA has the highest rate 29.8% (knee), 14,9% (phalange), 7,7% (hip) the above mentioned results being obtained on a population in Italy [3].

The prevalence of OA increases according to age, thus, approximately 3% of the patients over 55 years develop OA annually and about 4% of the OA diagnosed manifest the disease progressively [1].

Although the articular cartilage is seen as the major target in OA, it is not unnerved by nociceptors and the mechanism of the connection between losing the articular cartilage and the accentuation of the symptoms hasn't been made clear.

The pain in OA is caused by more factors and it occurs in periarticular structures, the articular capsule, the articular ligaments the outer layers of the meniscus, bursitis the bone and the medulla and the pathological structures (synovitis and capillarity's associated) are unnerved and can be affected in OA. These could be the direct source of pain, but also the indirect one, secondary to the abnormal forces and the destruction of the cartilage.

The loss of the cartilage is thought to increase the stress of the subchondral bone, causing bone modifications. These modifications make the stress sensitivity bigger, which can cause, pain and medulla injuries.

Moreover, the painful feeling can be influenced by other factors, such as culture, sex, and behavior factors [5].

Risk factors

The epidemiologic studies identified a lot of risk factors (etiological factors) when OA occurs, some of them with modifiable character [2]

Table I - Risk factors in OA

Age
Major articular traumas*
Repetitive stress and articular burden*
Obesity*
Sedentarism
Race
Gentic factors
Female
Congenital or acquired defects muscle weakness*
Quadriceps muscle weakness
Inflamatory articular disease
Endocrine or metabolic diseases
Proprioceptive deficit

**modifiable character chart on Brandt*

Within this article we aim towards a clinical study of pain in patients diagnosed with knee OA, after the intra articular treatment with Sodium hyaluronate

Material and method

The patients have been recruited in two stages: 50 patients in the period between 01.09.2004 and 01.03.2005 and in the second stage, other 50 patients, selected in the period 01.09.2013-15.12.2012, within the Clinic Laboratory of Physical Medicine, Rehabilitation and Rheumatology and the Magnetic Resonance Imaging Service of Clinical County Hospital of Constanta.

The study been included patients diagnosed on ACR criteria (American College of Rheumatology) with primary one-side or bilateral knee OA (idiopathic), with pain quantified on the visual analogue scale from 1 to 10.

Patients with knee OA secondary to diseases such as rheumatoid arthritis, spondilartropathy, gout, tuberculosis and so on have been excluded

The record that we used within the study is presented as follows:

Name……Age……Sex……
Weight……IMC……Traumatisms
…….....……

Pain RIGHT LEFT

Pain while walking Up and down steps ……..
Pain when walking on flat grounds ……...
Pain in resting position …….. ……
Pain superpatella ……. ……
Pain in patella (kneecap) mobilization …….
Pain in goosefoot insertion ……. ……
Pain in medial space articulation ……. ……
Pain in lateral space articulation ……. ……
Pain in popliteal fossa …… ……...

Objective

Cracments ……. ……
Tumefaction ……. ……
Flexibility active/passive ……. ……
Extension active/passive …… ……
Antero/posterior instability …… ……
Med - Lat Instability …… ……
Genu flexum/Genu valgum/Genu varum ……
Genu recurvatum .....

Measurements and snusde retractions

Medial kneecap .....Thigh circumference …..... Ischias skin retractions.....
Rightanteriorretraction…….....……
Testing flexor muscles .....……
Testing extensor muscles .....……
Maximum walking perimeter …….....
Walking limits without pain……
AINS daily dose…….....…Painkiller daily dose .....
Number of infiltrations/although year round.....

Radiology :

Joint space Kellgren ……

Table II - Characteristics of the selected lot

Characteristics	% nr. patients / media limits
Feminine sex	75% (75)
Age	63.33±5,89 ani (52-70)
Body mass index	32.8±5.79 (20.3-42.23)
Obesity	55.7%
Infiltrations in the last year	0
Associated pathology (Cardiovascular)	80%
Lequesne Index (0-24)	12-14
Standard knee x-ray with std. Kellgren- Lawrence II-III-IV	100%

The anamnesis focused on information about knee symptomatology: the presence of pain and its location, the presence of the cracments in mobilization, knee tumefaction, maximum grades of flexibility/extension, the presence of the antero-posterior instability, the presence of deformities (genu flexum, genu valgum, genu varum, genu recurvatum), filling in a standard personal medical chart, made on the occasion of this study, when it started, 30 days and 90 days after the intraarticular injection.

For the imaging estimation, in parallel with the clinic examination we used the evaluation of the radiographic modifications on (Table III), on antero-posterior and profile-knee radiographies to determine the stage of Kellgren-Lawrence knee OA.

Table III - Kellgren-Lawrance Radiographic classification

Stage	Severity of OA	Radiographic modifications
0	No	Normal
I	Uncertain	Small osteophytes doubtful significance
II	Minimum	Big osteophytes normal articular space
III	Moderate	Moderate narrowing of articular space
IV	Severe	Severe narrowing of the articular space with subchondral bone sclerosis

After Scott [13]

Figures 1 and 2 present the patients according to their pain registering on the visual analogue scale.

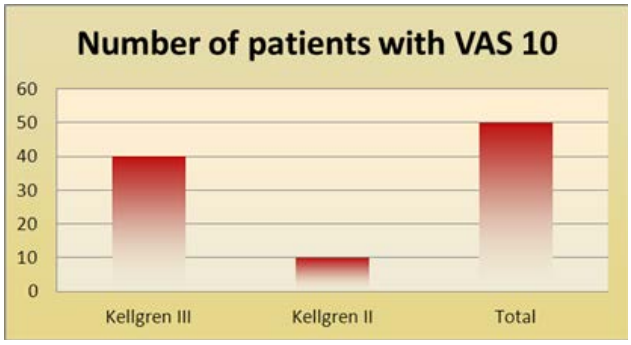

Figure 1 - Number of patients with visual analogue scale (VAS) 10

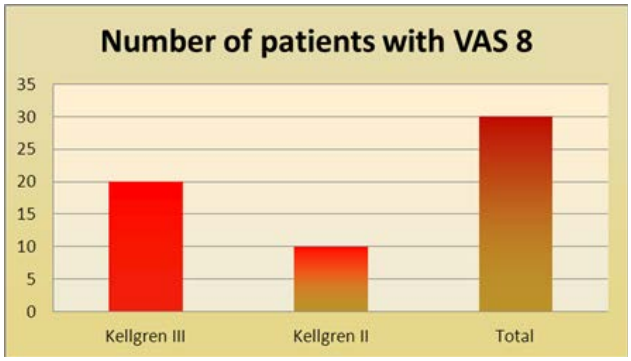

Figure 2 - Number of patients with visual analogue scale (VAS) 8

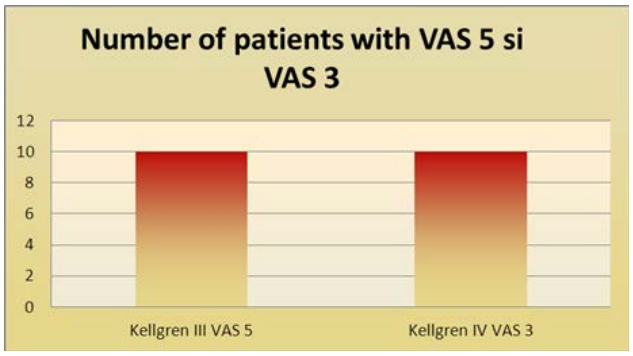

Figure 3 - Number of patients with visual analogue scale (VAS) 5 and 3

The intra-articular injections were performed, taking the previous approach, with the knee flexed 900, having as a reference point the tendon, the lower edge of the lateral femoral condyle and the higher edge of the tibial plateau.

We injected Sodium hyaluronate 2%, 3 injections, once every week; the use of this method was based on the interference of the pathogenic processes of declining of the articular cartilage.

Results

In the initial studies of the arthritis disease, one can notice a modification of collagen and proteoglycan synthesis, owing to the affected chondrocyte metabolism, synthetizing collagen types I,III, IX, X with reduced resistance and elasticity, and the proteoglycan have low dimensions and capacity of fixing the Hyaluronic acid.

It is demonstrated that joints affected by osteoarthritis processes the hyaluronate is found in reduced concentrations, the normal articular cartilage being replaced by fibrocartilage, in which the collagen type I is richly represented but its qualities are much inferior.

The exogen contribution of Sodium hyaluronate slows down the declining cartilage processes [6].

The statistical data is presented under the form average ±standard deviations. The statistic processing was made using test 1 student, valuesX2 = 6.35; 2 degrees of freedom p<0.042, at the limit of statistical significance but the difference are noticeable statistically

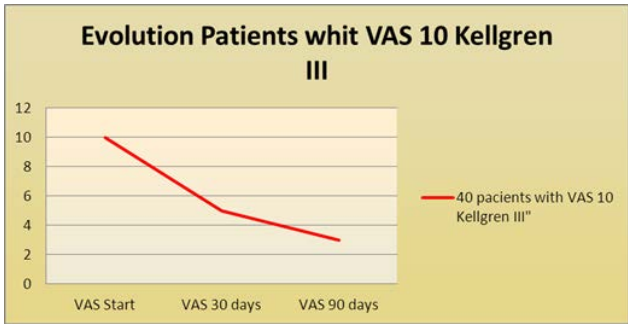

Figure 4 Evaluation Patients with VAS 10 Kellgren III

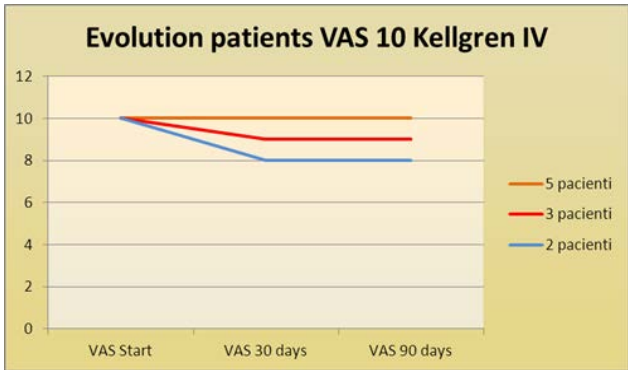

Figure 5 Evolution patients VAS 10 Kellgren IV

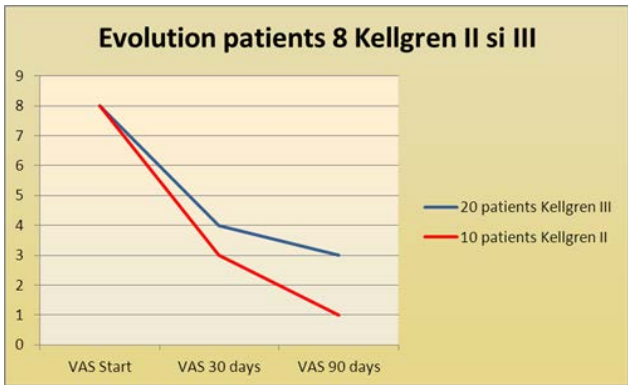

Figure 6 Evolution patients 8 Kellgren II and III

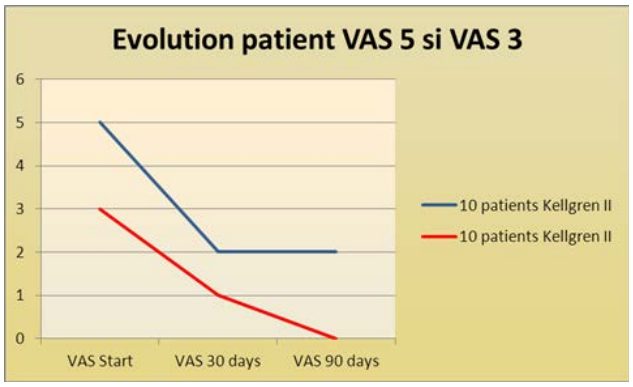

Figure 7 Evolution patient VAS 5 and VAS 3

▪pain estimation 30 days and 90 days after the last intra articular injection has been made

▪there has been noticed a visible release from pain measured on SAV, to patients whose degree/ value of pain, before the treatment with Sodium hyaluronate 2% was lower (3-5)

▪there has been noticed the visible release from pain measured on SAV to patients with radiologic modifications included in II and III stage.

Conclusions

- Sodium hyaluronate is a therapeutical method in knee OA
- at least in the period following its administration, one can feel pain release and better functioning (flat ground walking, going up and down the stairs)
- the results are obvious visible pain release and better functioning with patients in Kellgren radiological stages II and III of arthritic disease
- getting better to complete release with patients whose pain was less severe, before the treatment but also included radiologically in Kellgrem II stage.
- the pain is not visibly released after the treatment with Sodium Hyaluronate in stage IV Kellgren of arthritic disease and when the initial value on VAS is higher 8-10.
- one can draw the conclusion that the chondroprotective solutions, administered locally in initial stages of knee OA represent a way of treatment well tolerated, which reduces the pain symptomatology.
- no general or local side effects at the knee treated have been noticed.

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