



ОТО ————— International bulletin  
RHINO  
LARINGOLOGY



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of Otorhinolaryngology Head and Neck Surgery

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оториноларингология, хирургия на глава и шия



Bulgarian society  
of obstructive sleep apnea and snoring

Българско дружество  
по обструктивна сънна апнея и хъркане



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Place page number and first author's last name at top of each page.

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Title should be concise and descriptive. The title page should include the name of the author with initials or distinguishing first name, and the name and address of the hospital or institution where the work was performed.

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#### Article in book:

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# Балонна дилатация на Евстахиевата тръба (Представяне на клинични случаи)

*Balloon Dilatation Eustachian Tuboplasty (BET)  
(Case report)*

К. Джамбазов, Ст. Марков, А. Бешкова, К. Маджарова

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## Резюме:

**Увод:** Дисфункцията на Евстахиевата тръба (обструктивен тип) представлява невъзможност за правилна вентилация на средното ухо през нея. Това е често срещано заболяване, от което страдат около 0,9% от възрастното население и до 40% от децата на възраст под 10 г. Така нарушената вентилация на *savum tympani* и *proc. mastoideus* може да доведе до развитие на рекурентен серозен отит, хроничен среден отит с ретракция на мембраната и дори с холестеатом, перфорация на тъпанчевата мембрана, деструкция на костичките на средното ухо и др.

**Цел:** Използването на съвременен метод за лечение на дисфункцията на Евстахиевата тръба – балонна дилатация.

**Материал и методи:** Ние представяме два клинични случая на пациенти с диагностицирана дисфункция на Евстахиевата тръба, при които бе извършена за първи път в УМБАЛ „Св. Георги“ ЕАД Пловдив балонна дилатация на Евстахиева тръба.

**Резултати:** Пациентите бяха изписани с подобрене на оплакванията, но при извършените 30 дни след интервенцията контролни изследвания бяха диагностицирани резултати, близки до изходните.

**Изводи:** Балонната дилатация е нов микроинвазивен метод за лечение на дисфункцията на Евстахиевата тръба при пациенти, неповлияващи се от консервативно лечение.

## Abstract:

**Introduction:** Eustachian tube dysfunction, particularly the obstructive type means inability for proper ventilation of the middle ear through it. This common disease affects 0,9% of adults and almost 40% of children up to age of 10 years. This lack of middle ear ventilation may lead to recurrent serous otitis media, chronic otitis media with retraction and even cholesteatoma, perforation of the tympanic membrane, ossicular erosion, etc.

**Aim:** To be used modern method for Eustachian tube dysfunction managing – balloon dilatation Eustachian tuboplasty(BET).

**Material and Method:** We present you the first two patients who underwent BET in UMHAT “St. George” Plovdiv.

**Results:** Patients were discharged with improvement of the symptoms but the control tests at the 30<sup>th</sup> day after the intervention showed results similar to that before BET.

**Conclusions:** Balloon dilatation Eustachian tuboplasty is a new micro invasive method for treatment of the Eustachian tube dysfunction in cases with no improvement of the conservative treatment.

## Кратки анатомични данни

Евстахиевата тръба (*Tuba pharyngotympanica*) се отнася анатомично към структурите на средното ухо. Състои се от две части – хрущялна и костна, с обща дължина 31–38 мм.

Костната част на тръбата (*pars ossalis tubae Eustachii*) е с дължина 11–22 мм, с коса посока, водеща началото си от отвор в предната стена на *savum tympani*. Отворът е с размери 3,3/4,5 мм и води към канал (*semicanalis pro tuba auditiva*), който заема долната част на *canalis*

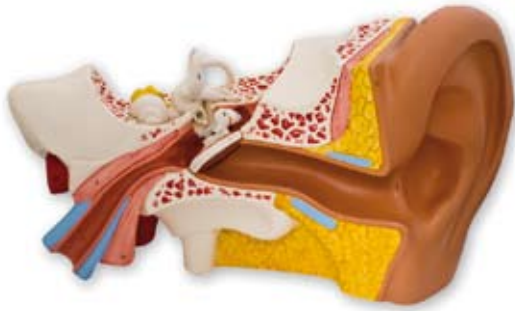
## Short anatomical data

The Eustachian tube /*Tuba pharyngotympanica*/ anatomically is in a close relationship with the structures of the middle ear. The tube consists of two parts – cartilaginous and bony with total length 31-38mm.

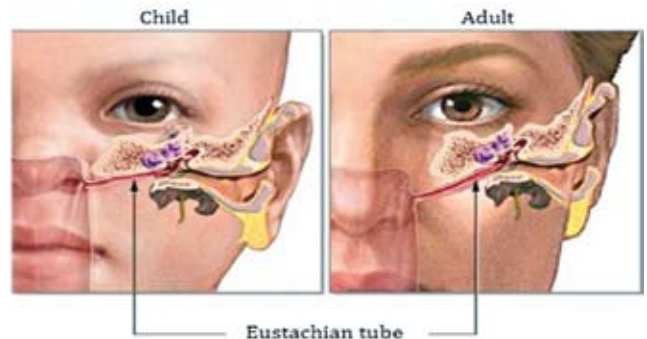
The bony part of the tube /*pars ossalis tubae Eustachii*/ is 11-22mm long, with oblique direction, leading its beginning from an aperture in the front wall of the tympanic cavity. The size of the aperture is 3,3/4,5mm and leads into a canal /*semicana-*



musculotubarius. Костният канал постепенно намалява своя диаметър и в областта на istmus tubae достига 2 мм. Истмусът на Евстахиевата тръба е най-тесната ѝ част, а също така и мястото, където костният ѝ сегмент се съединява с хрущялния под ъгъл от 45 градуса.



lis pro tuba auditiva/, which occupies lower part of the canalis musculotubarius. The bony canal gradually decreases its diameter and in the region of the isthmus of the tube reaches 2mm. The isthmus of the Eustachian tube is its narrowest part and also is the point where its bony segment connects with the cartilaginous one under 45° angle.



Фиг. 1 и 2. Анатомия на Евстахиевата тръба  
Fig. 1 and Fig. 2. Eustachian tube anatomy

Хрущялната част на тръбата заема латералните и 2/3 и е с дължина 24–26 мм. Хрущялът ѝ е прегънат на две, с по-дълга медиална и по-къса латерална част, поради което на напречен срез наподобява овчарска гега. Патоморфологично хрущялът на Евстахиевата тръба е от хиалинен тип със скелет от еластични и колагенни влакна. Фарингеалният край на хрущяла изпъква под лигавицата на епифаринкса, оформяйки *torus tubarius*, в центъра на който се намира цепковидният фарингеален отвор на Евстахиевата тръба (*ostium pharyngeum tubae auditivae*). Отворът се локализира на нивото на долна носна конха и е с размери, вариращи в широки граници (3–10 мм височина и 2–5 мм ширина).

## Дисфункция на Евстахиевата тръба

Дисфункцията на Евстахиевата тръба представлява невъзможност за правилна вентилация на средното ухо през нея. Това е често срещано заболяване, от което страда около 0,9%<sup>2</sup> от възрастното население, със симптоми на слухова загуба от проводен тип, оталгия, тинитус и чувство за пълнота в ушите, които се обострят при промяна на атмосферното налягане. Диагнозата се поставя с помощта на анамнезата, отоскопичната находка, тимпанометричните показания, аудиометрията, образни изследвания (СТ), тубоманометричните показания и маньовърът на Валсалва<sup>1</sup>. Дисфункция на Евстахиевата тръба се наблюдава при редица персистиращи заболя-

The cartilaginous part of the Eustachian tube occupies its lateral 2/3<sup>ts</sup> and is 24-26mm long. The cartilage is bended into two with medial part longer than the lateral one, this is why its transverse cut resembles to a shepherd's crook. Pathomorfologически the Eustachian tube cartilage is a hyaline type with skeleton consisting of elastic and collagen fibers.

The pharyngeal end of the cartilage knobs out under the epipharyngeal mucosa forming *torus tubarius*, in the centre of which the pharyngeal aperture cleft of the Eustachian tube is situated/*ostium pharyngeum tubae auditivae*/. The aperture is localized at the level of lower nasal conch and its size varies a lot /3-10mm high and 2-5mm wide/.

## Eustachian tube dysfunction

The Eustachian tube dysfunction is inability for a proper ventilation of the middle ear through it. It is a common disease of which suffers 0,9%<sup>2</sup> of the adults, with symptoms of conductive hearing loss, pain in the ears, tinnitus, ear obstruction feeling which intensifies when the air pressure changes. It is diagnosed with the help of anamnesis, otoscopic picture tympanometric and audiometric findings, CT scan, tubomanometry and Valsalva's maneuver<sup>1</sup>. The Eustachian tube dysfunction can be observed in a cases with several persistent middle ear diseases, and in cases with „Otitis media with effusion” it is included in the pathogenesis of the



вания на средното ухо, като при „отитис медиа ексудатива” тя е включена и в патогенезата на заболяването<sup>3,4</sup>. Докато при децата с напредване на възрастта и пълното развитие на Евстахиевата тръба често настъпва възстановяване на нейната функция, при 30–50% от възрастните пациенти, лекувани с консервативни средства (назални кортикостероиди, антихистамини и назални деконгестанти), получените резултати са незадоволителни<sup>5,6</sup>. Следваща крачка при лечението на тези пациенти е парацентезата с поставянето за няколко месеца на вентилационна тръбичка (Grommet), което от своя страна крие риск от създаването на трайна перфорация на тъпанчевата мембрана.

Развитието на съвременната ендоскопска техника създаде нов метод за миниинвазивно лечение на дисфункцията на Евстахиевата тръба – балонната дилатация, която през последното десетилетие показва изключително добри резултати и се използва все по-широко<sup>7</sup>.

### Балонна дилатация на Евстахиевата тръба – същност

Балонната дилатация на Евстахиевата тръба представлява е миниинвазивна процедура, представляваща поставяне на катетър с балон за определено време в хрущялната част на евстахиевата тръба, където в повечето от случаите с дисфункция се локализира проблема.



Фиг. 3. Водещ катетър за балонна дилатация на Евстахиева тръба  
Fig. 3. Leading catheter for BET

Интервенцията може да бъде извършвана както под локална, така и под обща анестезия. След първоначална риноскопия и епифарингоскопия (0° и 30° ригиден ендоскоп) в орифициума на Евстахиевата тръба под ендоскопски контрол с 30° или 45° оптика се поставя водещ катетър с ъгъл от 30°, 45° или 70° (Фиг. 3). По водещия катетър през отвора на Евстахиевата тръба в нейния лумен се прокарава катетър с балон (Фиг. 4), докато той срещне умерена съпротива – обикновено на дълбочина 13–16 мм (Фиг. 5). Раздува се балонът с помощта на физиологичен

disease<sup>3,4</sup>. While in children during their growing and Eustachian tube full development often full recovery of its function is observed, in adults in 30-50% of cases with conservative treatment /nasal steroids, antihistamines, and nasal decongestants/ the achieved results are unsatisfied<sup>5,6</sup>. The next step in these cases is the tympanotomy with ventilation tube application (Grommet) for a few months, this at the other hand is hiding a risk permanent tympanic perforation to be formed.

The development of the modern endoscopic technique nowadays created a new method for a minimally invasive treatment of the Eustachian tube dysfunction – Balloon dilatation Eustachian tuboplasty, which through the last decade showed extremely good results and is used wider and wider<sup>7</sup>.

### Balloon dilatation Eustachian tuboplasty (BET) – nature

Balloon dilatation Eustachian tuboplasty is a minimally invasive procedure which consists of laying a catheter with balloon for a certain time into the cartilaginous part of the Eustachian tube, where in most of the cases with dysfunction the problem is situated.

The intervention can be accomplished both under general and local anesthesia. After initial rhinoscopy and epipharyngoscopy /0° and 30° rigid endoscope/, in the pharyngeal aperture of the Eustachian tube under endoscopic control 30° or 45° optic a leading catheter with 30°, 45° or 70° angle is applied /Fig. 3/. Along the leading catheter through the Eustachian tube opening in its lumen catheter with a balloon is laid on /Fig. 4/ until it encountered moderate resistance – usually at depth 13-16mm /Fig. 5/. The balloon is inflated with physiological solution until reaching pressure 10-12 atmospheres



разтвор до достигане 10–12 атм. (Фиг. 6) . Катетърът с раздут балон престоява 30–120 секунди в лумена на Евстахиевата тръба, след което балонът се спада и катетърът се премахва.

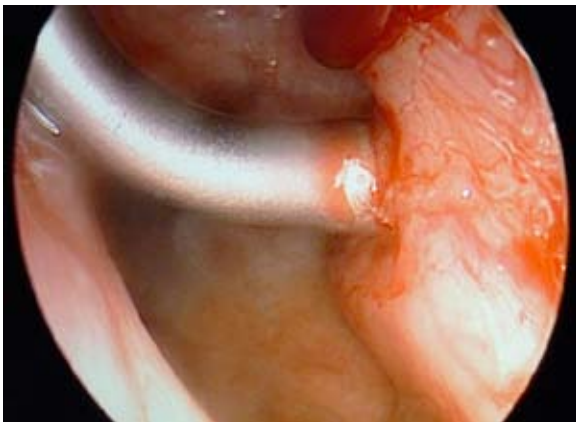
/Fig. 6/. The catheter with inflated balloon stays at place 30-120 seconds, after that the balloon is subsided and the catheter is removed.



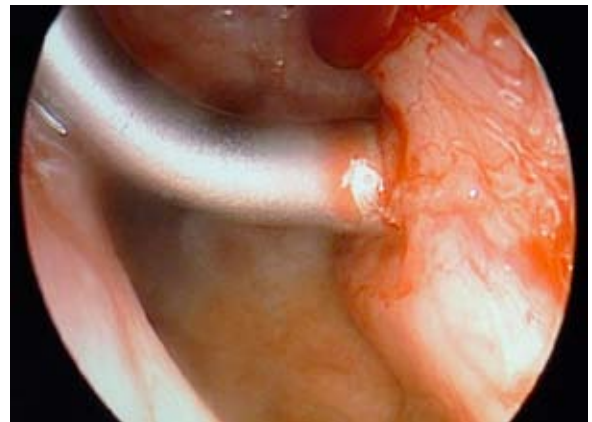
**Фиг. 3.** Водещ катетър за балонна дилатация на Евстахиева тръба  
**Fig. 3.** Leading catheter for BET



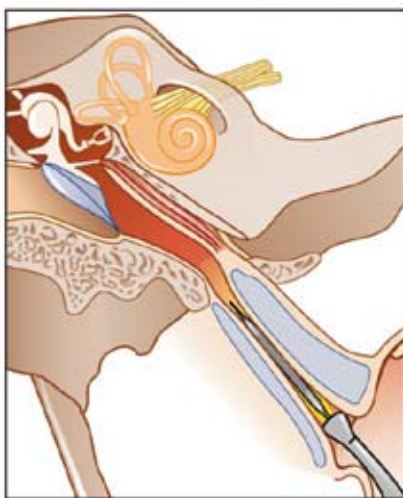
**Фиг. 4.** Катетър с балон за дилатация на Евстахиева тръба и помпа за нагнетяване на налягането.  
**Fig. 4.** catheter with balloon for dilatation of the Eustachian tube and pump for pressure augmentation.



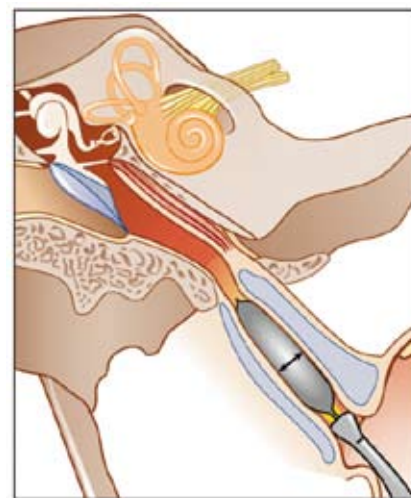
**Снимка 1.** Поставен в орифициума на Евстахиевата тръба водещ катетър за балонна дилатация.



**Picture 1.** Leading catheter in the pharyngeal aperture of the Eustachian tube.



**Fig 5.**



**Fig 6.**

**Фиг. 5 и 6.** Поставен в лумена на Евстахиевата тръба катетър с балон за дилатация  
**Fig. 5 and Fig. 6.** Catheter with balloon laid in the Eustachian tube lumen.



Резултатите показват, че балонната дилатация на Евстахиевата тръба може ефективно за подобри нейната функционалност. Процедурата се понася добре от пациентите и не се наблюдават тежки усложнения. Изключително важно за добър резултат от тази процедура е тя да се извършва след елиминация на всички фактори, влияещи на правилното функциониране на Евстахиевата тръба и средното ухо<sup>8</sup>.

В България методът е използван от проф. Меламед и доц. Петков за лечение на пациенти с епифарингеален карцином, позитивирали дисфункция на Евстахиевата тръба от обструктивен тип след проведена Т. Г. Т. (клиничните резултати от процедурата при този контингент не са добри). Доц. Цветков във ВМА – София използва балонната дилатация на Евстахиевата тръба от 2010 г. (изнесен доклад на тази тема на XI Белинов симпозиум). Проследените от него пациенти след дилатация на Евстахиевата тръба показват отлично повлияване на симптомите и силно подобрене на слуха – нормализиране на тимпанометриите и аудиометриите.

## Клинични случаи

Представяме ви два клинични случая на пациенти с диагностицирана дисфункция на евстахиевата тръба, при които бе извършена за първи път в УМБАЛ „Св. Георги“ ЕАД – Пловдив балонна дилатация на Евстахиева тръба.

Касае се за пациенти Д. И. 64 г. И.З. №58658 и Н. Б. 61 г. И. З. №58641 с дългогодишни оплаквания от намаление на слуха на двете уши, чувство за пълнота в ушите и тинитус. Двамата пациенти са провели консервативно лечение с локални и системни кортикостероиди и антихистамини, както и с локални деконгестанти без повлияване на оплакванията.

## Клинична находка

Отоскопията показва тъпанчеви мембрани без възпалителни промени, с ограничена подвижност, разлят светлив рефлекс и прозиращ ексудат в *cum tympani*. И при двамата пациенти се извърши СТ на нос и околоносни кухини (без патологична находка), както и СТ на темпорални кости, които показаха хронични изменения в *cum tympani* и *proc. mastoideus*, запазена слухова верига и силно стеснен лумен на Евстахиевите тръби. Валсалва бе отрицателен и за двете уши. Аудиометричното изследване при

The results show that BET can effectively improve functionality of the Eustachian tube. The patients sustain well the procedure and no severe complications are observed. It is essential for the achieving good results, the procedure to be made after elimination of all factors influencing the proper functioning of the Eustachian tube and middle ear<sup>8</sup>.

In Bulgaria BET had been used by professor Melamed and assoc. professor Petkov in patients with epipharyngeal cancer for treatment their Eustachian tube dysfunction after radiotherapy application /clinical results from the procedure in this cases are not good/. Assoc. professor Tsvetkov in MMA Sofia uses balloon dilatation Eustachian tuboplasty since 2010 year Доц. Цветков във ВМА София използва балонната дилатация на евстахиевата тръба от 2010г. /official report upon BET et the XI<sup>th</sup> Belinov's Symposium/. The patients who had been followed up by him after the Eustachian tube dilatation showed excellent symptom affection and great hearing improvement – tympanometric and audiometric results become into normal.

## Clinical Cases

We present two clinical cases with diagnosis “Eustachian tube dysfunction” in which BET was performed for the first time in UMHAT “St. George”.

The patients were D.I. 64 y old and N.B. 61y old with long term complains of hearing loss of both ears feeling of fullness in them and tinnitus. Both patients have been treated conservatively with local and system steroids and antihistamines, as well as with local decongestants without any effect upon the complains.

## Clinical findings

The otoscopies showed tympanic membranes without inflammation changes, with restricted mobility, unclear light reflex and translucent exudation in the tympanic cavity. Both patients underwent nose and paranasal sinuses CT scan /no pathology found/ as well as temporal bones CT scan which showed chronic changes in the tympanic cavity and mastoid bone, intact ossicular chain and severely narrowed lumen of the Eustachian tubes. Valsalva's test was negative for both ears. The audiometric test of D.I. showed bilateral, symmetric conductive

пациента Д. И. показа двустранно симетрично намаление на слуха от проведен тип за честотите до 3000Hz и чисто приемно намаление на слуха над тази честота (Фиг. 7 и Фиг. 8).

hearing loss for the frequencies up to 3000Hz and pure sensorial hearing loss above that frequency /Fig. 7 and Fig. 8/.



Фиг. 7.

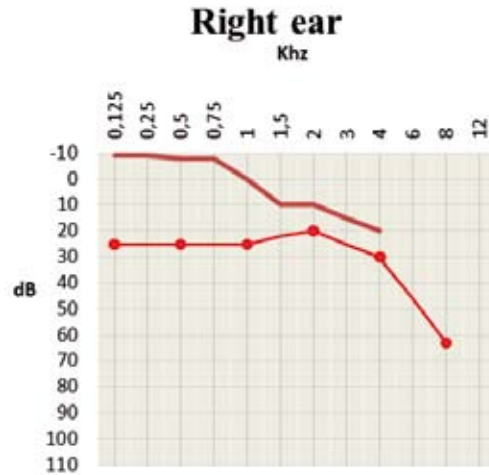
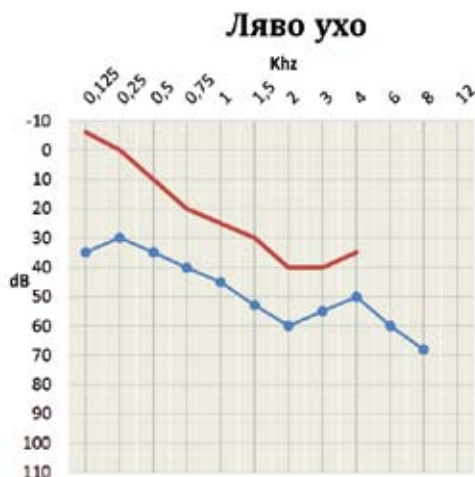


Fig. 7



Фиг. 8.

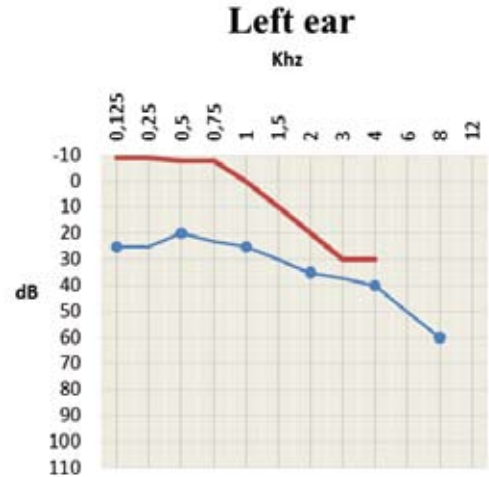
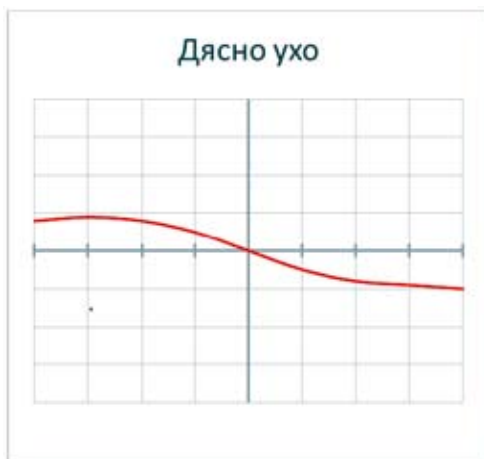


Fig. 8

Тимпанометрията на Д. И. показва плоска крива (Тип В) за дясно ухо и изместена към отрицателните налягания тимпанометрична крива (Тип С) за ляво ухо (Фиг. 9 и Фиг. 10).

The right ear tympanogram of D.I. is plate /Type B/ and the left one is dislocated to the negative pressure values /Type C/, /Fig. 9 and Fig. 10/.



Фиг. 9.

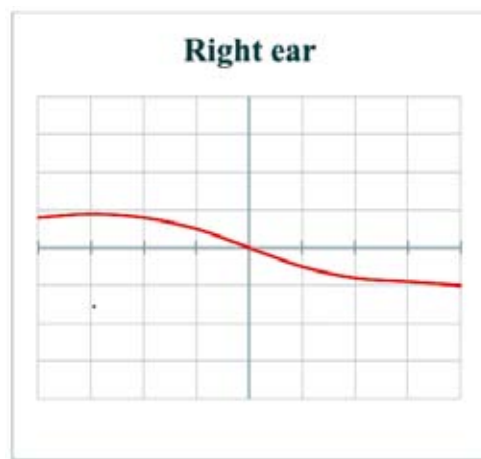
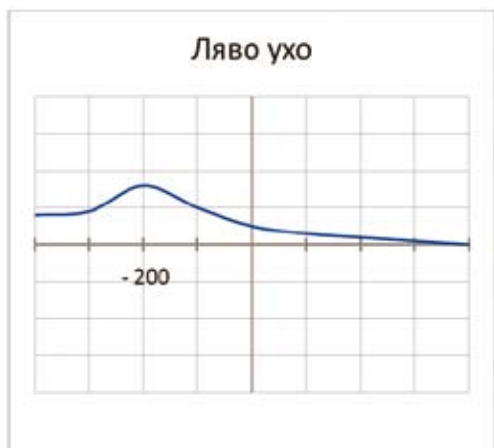


Fig. 9



Фиг. 10.

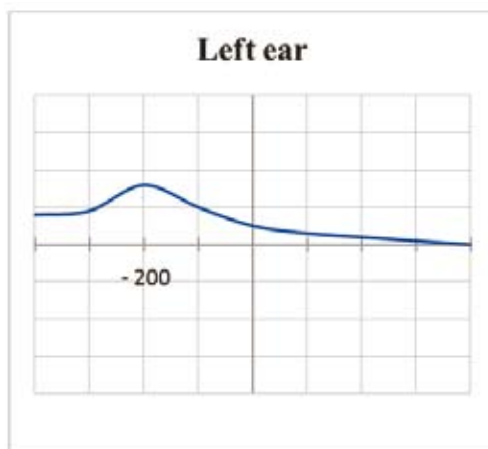
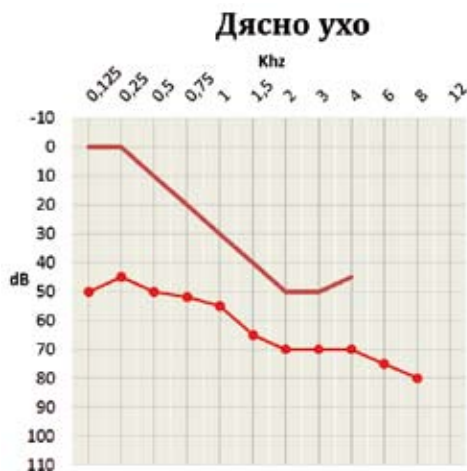


Fig. 10

Аудиометричното изследване при пациента Н.Б. показва двустранно симетрично намаление на слуха от комбиниран тип (Фиг. 11 и Фиг. 12).

The audiometric test of N.B. showed bilateral, symmetric, combined hearing loss /Fig. 11 and Fig. 12/.



Фиг. 11.

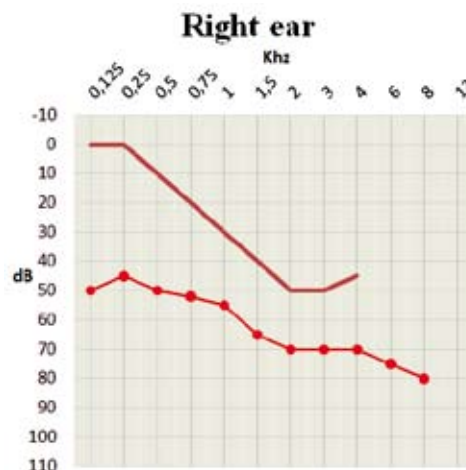
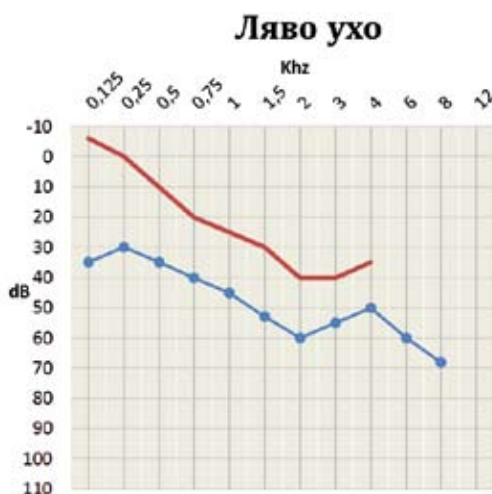


Fig. 11



Фиг. 12.

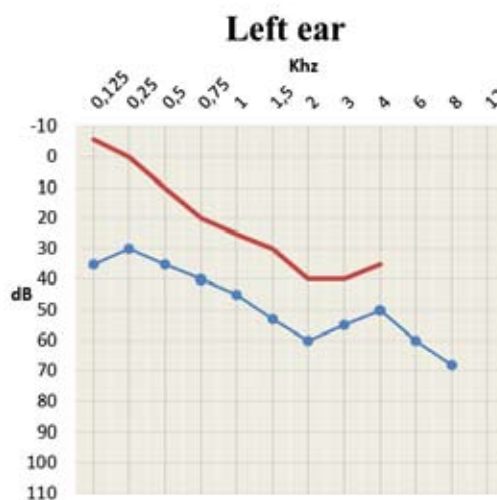
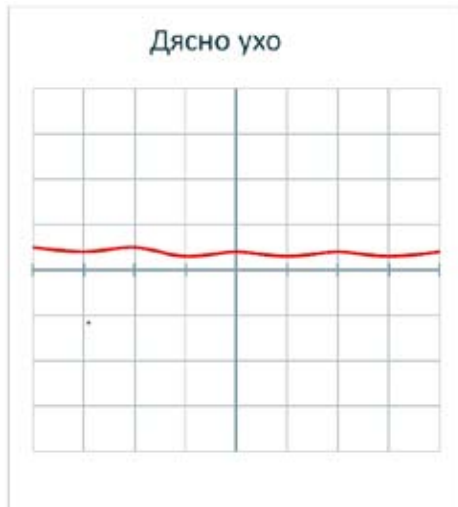


Fig. 12

Тимпанометрията на Н. Б. показва плоска крива (Тип В) за дясно ухо и изместена към отрицателните налягания тимпанометрична крива (Тип С) за ляво ухо (Фиг. 13 и Фиг. 14).

The right ear tympanogram of N.B. is plate /Type B/ and the left one is dislocated to the negative pressure values /Type C/, /Fig. 13 and Fig. 14/.





Фиг. 13.

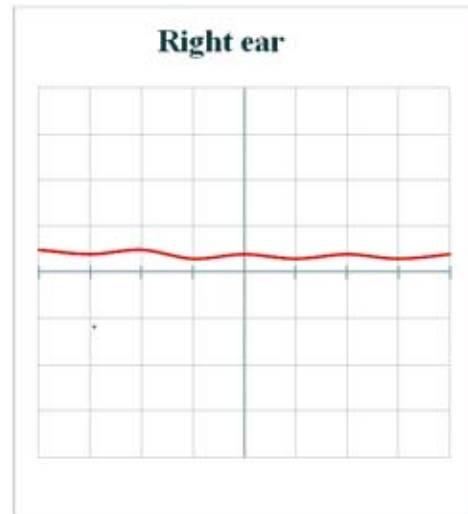
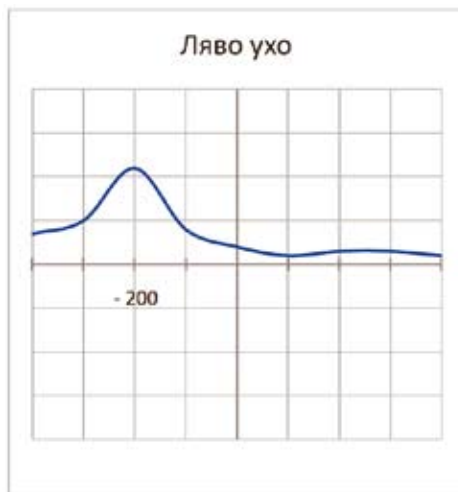


Fig. 13



Фиг. 14.

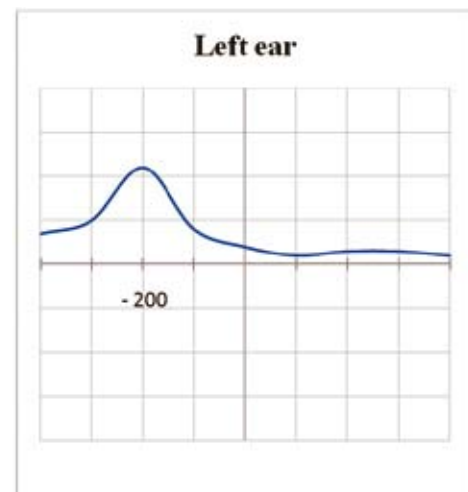


Fig. 14

### Кратко описание на извършената оперативна процедура

След щателна предоперативна подготовка под обща интубационна анестезия и при двамата болни се постави в орифициума на Евстахиевата тръба под ендоскопски контрол с 30° оптика водещият катетър с ъгъл от 45°, след което по него, през отвора на Евстахиевата тръба в нейния лумен се прокара катетър с балон. Разду се балонът с помощта на физиологичен разтвор до достигане на 10 атм. Катетърът с раздут балон престоя 120 секунди в лумена на Евстахиевата тръба, след което балонът се спадна и катетърът се премахна. Процедурата бе повторена и за другата Евстахиева тръба на болните. По време на престоя на катетъра с раздут балон ясно се видя през ендоскопа изтичането на задържания серозен секрет от *cavum tympani*, като най-демонстративно бе по време на дилатацията на дясната Евстахиева тръба на Д. И. Гладък следоперативен период.

### Short description of the performed surgery

After an accurate preoperative preparation under general anesthesia in both cases under endoscopic control /30° optic/ in the pharyngeal opening of the Eustachian tube the leading catheter with 45° angle was placed, after that along the leading catheter through the Eustachian tube opening in its lumen catheter with a balloon was laid on. The balloon was inflated with physiological solution until reaching pressure 10 atmospheres. The catheter with inflated balloon stayed at place 120 seconds, after that the balloon was subsided and the catheter was removed. The procedure was repeated for the other patients' Eustachian tube. Until the period when the balloon was inflated it was clearly seen through the endoscope the leakage of the secretion held in the tympanic cavity, and most pointedly it was by the time of the right Eustachian tube dilatation of D.I. Postoperative period with no complications.



В деня след балонната дилатация пациентите Д.И. и Н. Б. бяха изписани без оплаквания, в добро общо състояние, като съобщиха за субективно подобрене на слуха и редукция на тинитуса.

Тридесет дни след процедурата бяха извършени контролни аудиометрични и тимпанометрични изследвания на слуха, които за съжаление показваха резултати близки, до изходните, и за двамата пациенти.

## Обсъждане и изводи

Балонната дилатация е нов микроинвазивен метод за лечение на дисфункцията на Евстахиевата тръба при пациенти, неповлияващи се от консервативно лечение. Той е поредната нова методика, станала възможна благодарение на развитието на ендоназалната техника и методите на ендоназалната хирургия. Успеваемостта на процедурата зависи не само от безупречното ѝ изпълнение, но и от правилния подбор на пациентите за нея. Сравнително високата цена на необходимите за извършването ѝ консумативи е основна пречка за превръщането ѝ в рутинен метод за лечение на тубарната дисфункция от обструктивен тип.

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The day after BET the patients D.I and N.B. were discharged in good condition without any complains, and they informed about subjective hearing improvement and tinnitus reduction.

Thirty days after the procedure control audiometric and tympanometric hearing test were made. In both cases they showed unfortunately results similar to those before BET execution.

## Discussion and conclusions

Balloon dilatation Eustachian tuboplasty is new micro invasive method for Eustachian tube dysfunction treatment, in cases with no effect from conservative treatment. It is a new method which becomes possible because of the development of the endonasal technique and methods of the endonasal surgery. The procedure success depends not only on its perfect execution but also depends on the proper patients selection for it. The comparatively high prize of the materials necessary for its execution is the main obstacle for it to become a routine method for Eustachian tube dysfunction treatment.

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# FESS при лечение на орбитални заболявания и усложнения

## *FESS for the Management of Orbital Disease and Complications*

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### **Резюме:**

**Цел на изследването:** Целта на това проучване е да разгледа лечението на пациенти със заболявания на орбитата и орбитални усложнения. Ние представяме нашия опит с ендоскопско лечение на орбитални заболявания и усложнения.

**Материали и методи:** Ретроспективен анализ на лечението на пациенти с орбитални заболявания и усложнения от 2012 г. до 2013 г. Отчетени са демографските данни на пациентите, клиничната картина, локализацията на заболяването, лечението, усложненията и изходът от лечението.

**Резултати:** Общо 10 пациенти с орбитални заболявания и усложнения са лекувани през този период в клиниката. От тях четири са жени и шест – мъже. Пет пациенти са имали туморни заболявания и при тях е предприета ендоскопска декомпресия на орбитата. От тях един пациент е имал етмоидален остеом с компресия на орбитата, двама пациенти са имали авансирал орбитален хемангиом и двама пациенти са били с екзофталам поради болестта на Грейвс. Двама пациенти са били с орбитални усложнения поради мукоцеле на фронталния синус и са лекувани с комбиниран ендоскопски и класически достъп. Трима пациенти са имали субпериостален орбитален абсцес. При тях абсцесът е дрениран ендоскопски. При всички пациенти е наблюдавано подобрене и пълно излекуване. При един пациент е настъпил епистаксис поради нараняване на а. sphenopalatina. Кървенето е спряно с ендоскопска ревизия.

**Заключение:** Нашият опит показва, че ендоскопската синус хирургия при лечение на орбитални заболявания и усложнения е безопасна и ефективна и това е в съответствие с данните, съобщени от други автори.

### **Abstract**

**Objectives:** The aim of this study is to look at the treatment of patients with orbital diseases and complications. We present our experience with endoscopic treatment of orbital diseases and complications.

**Materials and methods:** A retrospective analysis of the management of patients with orbital diseases and complications from 2012 to 2013. Patients' demographic data, clinical picture, disease localization, management, complications and outcomes are reported.

**Results:** A total of 10 patients with orbital complications and diseases have been treated during this period in our clinic. Of them, four were female and six – male. Five patients had tumors and endoscopic decompression of the orbit was performed. Of them, there was one case of ethmoid osteoma with compression of the orbit, two cases of advanced orbital hemangioma, and two cases of exophthalmos due to Graves' disease. Two patients had orbital complications due to frontal sinus mucocele and were managed with a combined endoscopic and external approach. There were three cases of subperiosteal orbital abscess. They underwent endoscopic anterior ethmoidectomy and incision and drainage. All patients had improvement of symptoms or full remission. One patient had epistaxis due to injury to a. sphenopalatina. Bleeding was controlled by endoscopic revision.

**Conclusions:** Our experience shows that endoscopic sinus surgery for the management of orbital disease and complications is safe and effective and this is in line with data reported by other authors.

## **Въведение**

Орбиталните усложнения от заболявания на синусите са сериозно заболяване, което може да доведе до функционален дефицит чрез увреждане на очевдигателните мускули или n. opticus. Съществуват значителен брой заболявания, които могат да са в основата на такива услож-

## **Introduction**

Orbital complications of sinus diseases are serious and can lead to functional impairment by affecting oculomotor muscles or n. opticus. There is a significant number of diseases that can lead to such complications. Inflammatory diseases – mostly acute sinusitis, subperiosteal abscess. Tumors



нения. Възпалителни заболявания – най-често остър синусит, субпериостален абсцес. Тумори – доброкачествени или малигнени, остеома, меланома, плоскоклетъчен карцином, аденокарцином. Злокачествените тумори се развиват най-често през шестото или седмото десетилетие от живота. Синоназалните злокачествени тумори са под 1% от злокачествените тумори. Други заболявания могат да са ревматични, автоимунни – грануломатоза на Вегенер, ендокринни – болест на Грейвс, мукоцеле, травма. Класификация на Chandler на орбиталните усложнения при синусит – възпалителен оток, орбитален целулит, субпериостален абсцес, орбитален абсцес, тромбоза на кавернозния синус.

Диференциално-диагностично трябва да се споменат и дакриоцистит/дакриоаденит, конюнктивит, ухапвания от инсекти, дентогенни абсцеси, алергични риносинусити, възпалена атерома, чужди тела в орбитата.

Симптоми – оток на клепачите, болка в окото или лицето, главоболие, фотофобия, нарушено зрение, екзофталм, амавроза, загуба на зрението, епистаксис, пурулентна ринорея, нарушение в движението на окото, диплопия.

### **Лечение на заболяванията на орбитата и орбитални усложнения**

Консервативно – интравенозни антибиотици при възпалителни заболявания, стероиди при автоимунни, химио-радиотерапия при малигнени заболявания.

Хирургично лечение – външен класически достъп, ендоскопска синус хирургия.

Външен класически достъп – външна етмоидектомия или орбитотомия, външна фронтотетмоидотомия, трепанация на фронталния синус, орбитална екзентерация.

Ендоскопска синус хирургия – ендоскопско дрениране на субпериостален абсцес, ендоскопско лечение на мукоцеле, ендоскопска резекция на остеома, ендоскопска туморрезекция, ендоскопска орбитална декомпресия. Предимства на ендоскопското лечение – ниска травматичност, липса на козметични дефекти, белези, по-бързо възстановяване, по-нисък риск за риноликворея, стеноза на назофронталния дукт, стеноза на назолакрималния канал, диплопия. При ендоскопското лечение се цели запазване на интраорбиталните структури.

– benign or malignant, osteoma, melanoma, squamous cell carcinoma, adenocarcinoma. Malignant tumors develop most often in the sixth or seventh decade of life. Sinonasal malignant tumors are less than 1% of malignant tumors. Other diseases may be rheumatic, autoimmune – Wegener's granulomatosis, endocrine – Graves' disease, mucocele, trauma. Chandler's classification of orbital complications arising from sinusitis – inflammatory oedema, orbital cellulitis, subperiosteal abscess, orbital abscess, cavernous sinus thrombosis.

In the differential diagnosis must be included dacryocystitis / dacryoadenitis, conjunctivitis, insect bites, dental abscesses, allergic rhinosinusitis, inflamed atheroma, foreign bodies in the orbit.

Symptoms – swelling of the eyelids, eye or facial pain, headache, photophobia, impaired vision, exophthalmos, amaurosis, vision loss, epistaxis, purulent rhinorrhea, impaired eye movement, diplopia.

### **Management of orbital diseases and complications**

Conservative – intravenous antibiotics in inflammatory diseases, steroids in autoimmune diseases, chemo-radiotherapy in malignant diseases.

Surgical treatment – classic external approach, endoscopic sinus surgery.

Classic external approach – external ethmoidectomy or orbitotomy, external frontoetmoidotomy, trepanation of the frontal sinus, orbital evisceration.

Endoscopic sinus surgery – endoscopic drainage of subperiosteal abscesses, endoscopic management of mucocele, endoscopic management of osteoma and other tumors, endoscopic orbital decompression. Advantages of the endoscopic management – less traumatic, no cosmetic defects and scarring, faster recovery, less risk for CSF leak or stenosis of the nasolacrimal or frontal sinus duct, diplopia. With the endoscopic management the aim is to preserve the intra-orbital structures.

## Нашият опит

В клиниката за периода 2012–2013 г. оперативно са лекувани 10 пациенти. От тях 4 са жени и 6 – мъже. Пациентите са на възраст от 4 до 64 години. Средната възраст е 48 години. Пет пациенти са имали тумори, компресиращи орбитата. Един пациент е бил с етмоидален остеом. Двама пациенти са били с орбитален хемангиом. Двама пациенти са имали екзофтальм от болест на Грейвс. Двама пациенти са имали орбитална компресия от мукоцеле на фронталния синус, а трима са били със субпериостален абсцес от остър етмоидален синуит. Всички пациенти са лекувани с ендоскопска синус хирургия. При пациентите със субпериостален абсцес е направена предна етмоидектомия и абсцесите са дренирани ендоскопски. Пациентите с фронтално мукоцеле са лекувани с комбиниран ендоскопски и класически достъп, изпълнен е Draf IIb ендоскопски достъп. При пациента с етмоидален остеом е извършена задна етмоидектомия и резекция на остеома. При пациентите с орбитален хемангиом и екзофтальм е извършена ендоскопска декомпресия на орбитата.

При всички пациенти е наблюдавана пълна резолюция на симптомите. Пациентите са проследявани на третия и деветия месец постоперативно. Наблюдаван е един случай на епистаксис от а. sphenopalatina, което е наложило ендоскопско лечение. Пациентите са изписани на третия постоперативен ден.

## Клиничен случай – орбитален хемангиом

Представяме 62-годишен пациент с диплопия, главоболие и конюнктивални хеморагии на лявото око (Фиг. 1). Симптомите датират от една година. КАТ на околоносните синуси (Фиг. 2 и 3) показва обструкция на остеомеаталния комплекс в ляво при липса на синусна патология. В лявата орбитална кухина е налично мекотъканно образувание, разположено до медиалната стена. Поставена е работна диагноза – орбитален хемангиом. След обсъждане с пациента е решено да се пристъпи към оперативна интервенция за биопсия и подобряване на симптомите. Проведена е предна и задна етмоидектомия с декомпресия на лява орбита (Фиг. 4). Туморното образувание е биопсирано и е потвърдена диагнозата – хемангиом. Следоперативно не се наблюдават

## Our experience

During the period 2012–2013, we treated surgically 10 patients with orbital diseases and complications. Of them 4 were female and 6 – male. Patients ranged in age from 4 to 64 years. The average age was 48 years. Five patients had tumor compression of the orbit. One patient had ethmoid osteoma. Two patients had orbital hemangioma. Two patients had exophthalmos of Graves' disease. Two patients had orbital compression from frontal sinus mucocele, three patients had subperiosteal abscess from acute ethmoidal sinusitis. All patients were managed with endoscopic sinus surgery. Patients with subperiosteal abscess were managed with ethmoidectomy and the abscesses are drained endoscopically. Patients with frontal sinus mucocele were treated with combined endoscopic and classic external approach, Draf IIb endoscopic approach was performed. In patients with ethmoid osteoma we performed posterior ethmoidectomy and resection of the osteoma. In patients with orbital hemangioma and exophthalmos we performed endoscopic decompression of the orbit.

All patients experienced complete resolution of symptoms. Patients were followed on the third and ninth months postoperatively. There was one case of epistaxis from a. sphenopalatina, which required endoscopic management. Patients were discharged on the third postoperative day.

## Clinical case – orbital hemangioma

62 year old patient presented with diplopia, headache and conjunctival haemorrhage in the left eye (Fig. 1). The symptoms date since one year. CT scan of the paranasal sinus (Fig. 2 and 3) showed obstruction of the osteomeatal complex on the left side without any other sinus pathology. There was soft tissue formation located close to the medial wall of the left orbit. The clinical impression was that of orbital hemangioma. After discussion with the patient we decided to proceed with the surgery in order to perform a biopsy and to improve the symptoms. We performed anterior and posterior ethmoidectomy for decompression of the left orbit (Fig. 4). The tumor was biopsied and we confirmed the diagnosis – hemangioma. Postoperatively the symptoms of diplopia and conjunctival haemor-



симптоми на диплопия и конюнктивални хеморагии. Направени са контролни прегледи на втора седмица, трети и шести месец. До този момент няма данни за рецидивирание на симптомите.

rhage resolved. Follow-up was performed on the second week, third and sixth month. So far there is no evidence of recurrence of the symptoms.



Фиг. 1. Конюнктивална хеморагия



Fig. 1. Conjunctival haemorrhage



Фиг. 2. Обструкция на ляв остеомеатален комплекс



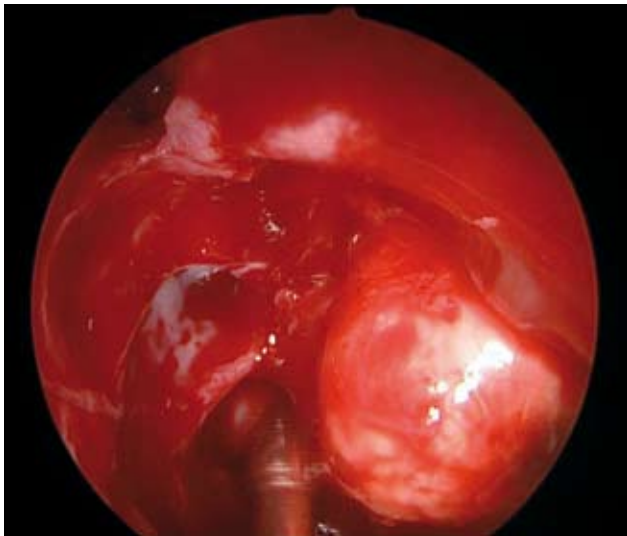
Fig. 2. Obstruction of the left osteomeatal complex



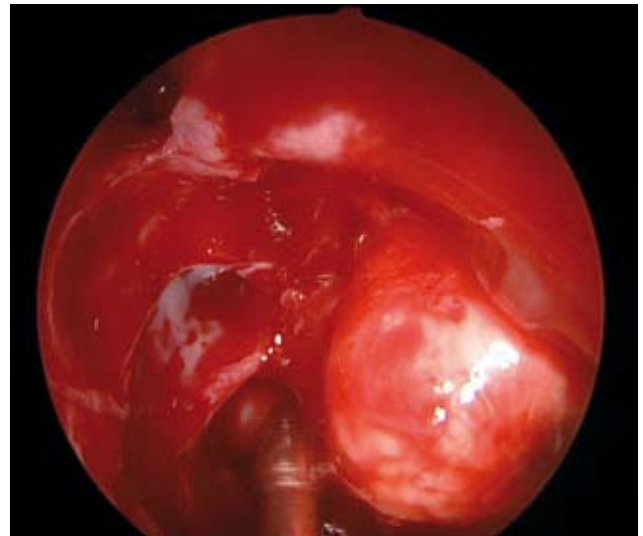
Фиг. 3. Мекотъканно образуване в лява орбита



Fig. 3. Soft tissue mass in left orbit



**Фиг. 4.** Декомпресия на лява орбита и протрузия на хемангиома



**Fig. 4.** Decompression of the left orbit and prolapse of the hemangioma

## Дискусия

С развитието на нови инструменти и техники ендоскопските методи добиват все по-голяма популярност за лечение на орбитални заболявания и усложнения. Всички пациенти с такава патология са лекувани с ендоскопски методи в нашата клиника. Резултатите от ендоскопското лечение са сходни с тези при класическите външни достъпи, при значително по-малка травматичност и по-къс период на възстановяване, със запазване на нормалната функция на окото. При малигнени заболявания все още се налага подбор на подходящите за ендоскопско лечение пациенти. При доброкачествените заболявания резултатите от ендоскопско лечение са равни и по-добри от тези при класическите външни достъпи със запазване на нормалната функция.

## Заклучение

Въз основа на нашия опит и на този на други автори можем да заключим, че ендоскопската синус хирургия е безопасен ефективен метод за лечение на заболявания на орбитата и орбитални усложнения. Лечението при малигнени заболявания на орбитата трябва да става след обстоен анализ и подбор на пациентите и в зависимост от типа и разпространението на тумора може да наложи използването на класически външни техники на достъп или химио-радиотерапия и палиативно лечение. Продължаващото развитие на навигационните техники ще разширява все повече възможностите и показанията за

## Discussion

With the development of new tools and techniques the endoscopic methods become more common option for the treatment of orbital disease and complications. In our department all patients with such pathologies are treated with endoscopic surgery. The results of endoscopic treatment are similar to those in traditional external approach with significantly lower invasiveness and a shorter recovery period, with preservation of the normal function of the eye. Malignant cases still require careful selection of appropriate patients for endoscopic management. The outcome of endoscopic management of benign pathologies is equal and better than this of conventional external approaches with preservation of the normal function when performing endoscopic surgery.

## Conclusion

Based on our experience and that of other authors we can conclude that endoscopic sinus surgery is a safe and effective method to treat diseases of the orbit and orbital complications. Treatment of malignant diseases of the orbit should be done after a thorough analysis and selection of patients and depending on the type and spread of the tumor may require the use of classical techniques of external approach or chemo-radiotherapy and palliative treatment. Continuing development of intraoperative navigation techniques will expand the indications for endoscopic treatment. Classical methods of external approach are still utilised in the man-





ендоскопско лечение. Класическите методи с външен достъп все още се използват при лечение на орбитални усложнения и заболявания, но ендоскопските методи добиват все по-голяма популярност.

agement of orbital complications and diseases, but endoscopic methods are becoming more popular and widespread.

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# Ендоскопска дакриоцисториностомия – нашият опит

*Endoscopic Dacryocystorhinostomy – Our Experience*

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## Резюме:

**Цел на изследването:** Целта на това проучване е да представи опита ни при ендоскопско лечение на хронична обструкция на назолакрималния канал.

**Материали и методи:** Ретроспективен анализ на проведеното лечение с ендоскопска дакриоцисториностомия на пациенти с хронична стеноза и обструкция на назолакрималния дукт. Отчетени са демографските данни на пациентите, приложената техника, усложненията и изходът от лечението, удовлетворението на пациентите от резултата.

**Резултати:** Общо 11 пациенти със стеноза или обструкция на назолакрималния дукт са лекувани в клиниката. При всички е приложена ендоскопска дакриоцисториностомия. От пациентите 8 са жени и 3-ма са мъже. От тях 9 са с едностранни оплаквания и 2-ма са с двустранни. Резултатите показват проходимост на оперираните назолакримални канали при липса на рецидиви до този момент. Наблюдавали сме един случай на постоперативен епистаксис. Други усложнения не са наблюдавани.

**Заключение:** Нашият опит показва, че ендоскопското лечение на хроничната обструкция на назолакрималните канали е безопасно и ефективно и това е в съответствие с данните, съобщени от други автори.

## Abstract

**Objectives:** The aim of this study is to present our experience with endoscopic management of chronic obstruction of the nasolacrimal duct.

**Materials and methods:** Retrospective analysis of the patients with chronic stenosis and obstruction of nasolacrimal duct managed with endoscopic DCR. Patients' demographics, management techniques, complications and outcomes, patient satisfaction are reported.

**Results:** A total of 11 patients with stenosis or obstruction of the nasolacrimal duct were treated in our clinic. All patients were managed with endoscopic DCR. 8 of the patients were female and 3 – male. 9 of the patients had unilateral complaints and 2 – bilateral. The results showed patency of the operated nasolacrimal ducts in the absence of recurrence to date. There was one case of postoperative epistaxis. Other postoperative complications were not observed.

**Conclusions:** Our experience shows that endoscopic management of chronic obstruction of the nasolacrimal duct is safe and effective, and this is in line with data reported by other authors.

## Въведение

В България лечението на хроничната обструкция на назолакрималните канали се извършва почти изцяло от офталмолози, които бужират дукта на сляпо, много често неуспешно и с често рецидивирание.

Епифората е по-честа при жени. Етиологията ѝ бива първична и вторична обструкция на назолакрималния канал; остър или хроничен дакриоцистит; конгенитална обструкция на назолакрималния канал; тумори; риносклерома; фронтотмоидални мукоцеле; дакриоцистоцеле.

## Introduction

In Bulgaria the treatment of chronic nasolacrimal duct obstruction is carried out almost entirely by ophthalmologists who dilate the duct blindly, often unsuccessfully and recurrence is frequent.

Epiphora is more common in women. Most common etiology is primary and secondary nasolacrimal duct obstruction; acute or chronic dacryocystitis; congenital nasolacrimal duct obstruction; tumors; rhinoscleroma; fronto-ethmoid mucocele; dacryocystocele.



Диагнозата се поставя чрез анамнеза, назална ендоскопия, флуоресцеинов тест, иригация на назолакрималните канали, дакриоцистография, лакримална сцинтиграфия, КТ, ЯМР.

## Лечение

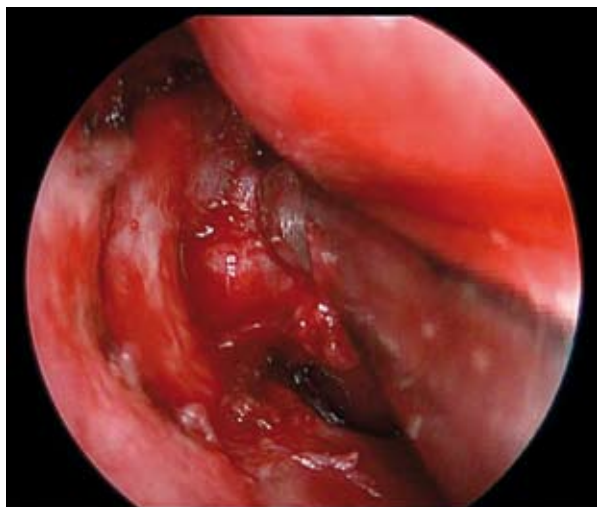
Първите стъпки в лечението на епифора са направени от Adeo Toti през 1904 г. Тогава той описва първата външна дакриоцисториностомия. През 1893 г. Caldwell описва ендоназален достъп, по-късно модифициран от West и Halle. През 1989 г. McDonough и Meiring описват ендоскопски достъп. През 1990 г. Massaro описва ендоскопска дакриоцисториностомия с използване на лазер.

Дакриоцисториностомията се подразделя на външна, ендоскопска и ендоскопска с използване на лазер.

## Ендоскопско лечение – хирургична техника

Инфилтрация на мукозата с лидокаин и адреналин.

Операцията се изпълнява при спазване на максимална атравматичност за избягване на последващи адхезии и рестеноза на риностомията.



**Фиг. 1.** Повдигане на мукопериостално ламбо от областта на лакрималния сак

The diagnosis is established by the history, nasal endoscopy, fluorescein test irrigation of the nasolacrimal duct, dacryocystography, lacrimal scintigraphy, CT, MRI.

## Management

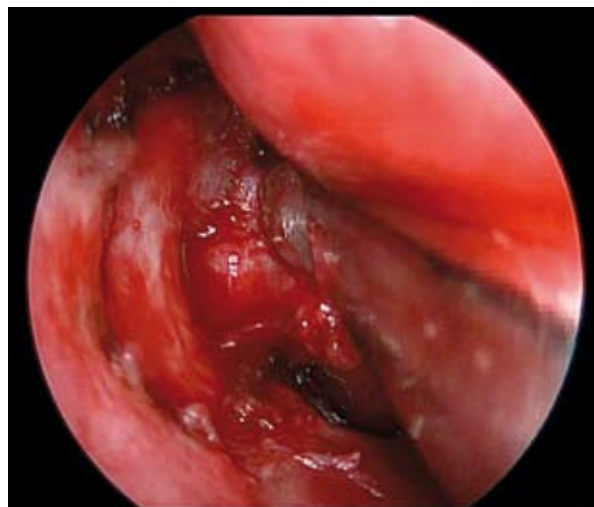
The first steps in the treatment of epiphora were done by Adeo Toti in 1904, when he described the first external approach for dacryocystorhinostomy. In 1893 Caldwell describes endonasal approach later modified by West and Halle. In 1989, McDonough and Meiring describe endoscopic approach. In 1990, Massaro describes endoscopic dacryocystorhinostomy using a laser.

Dacryocystorhinostomy is classified as external, endoscopic and endoscopic using laser.

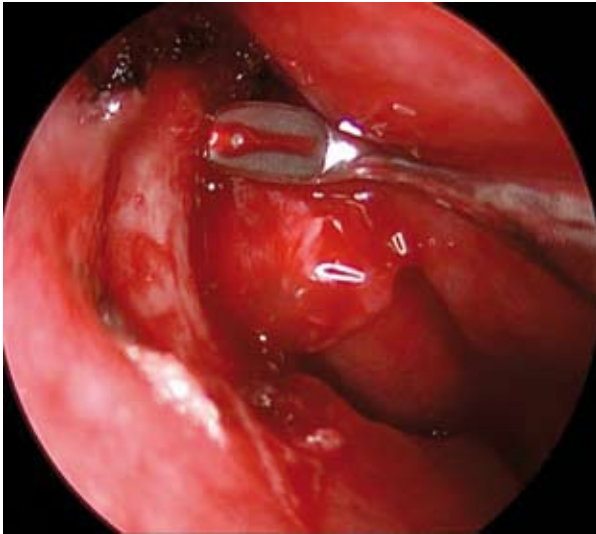
## Endoscopic management – surgical technique

Infiltration of the mucosa with lidocaine and epinephrine.

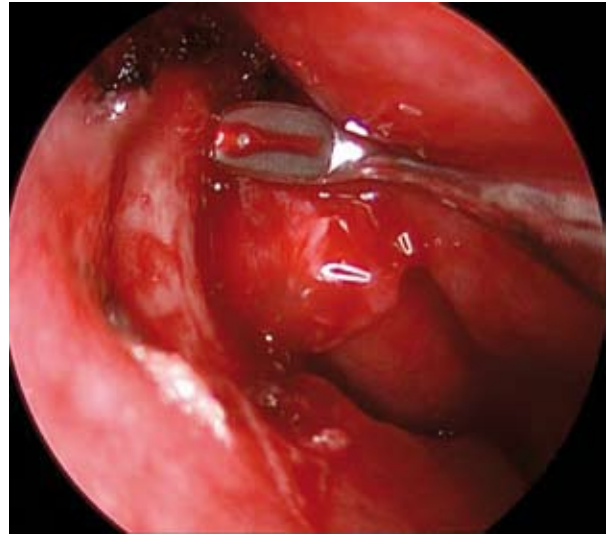
The surgery is performed in the most atraumatic fashion in order to avoid adhesions and subsequent restenosis of the rhinostomy.



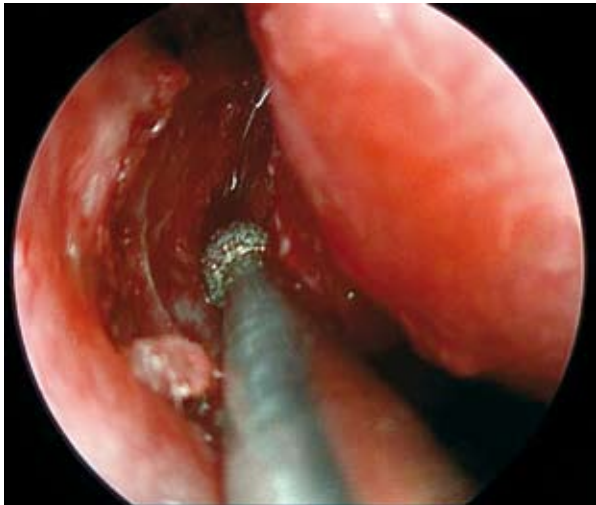
**Fig. 1.** Raising a mucoperiosteal flap in the area of the lacrimal sac



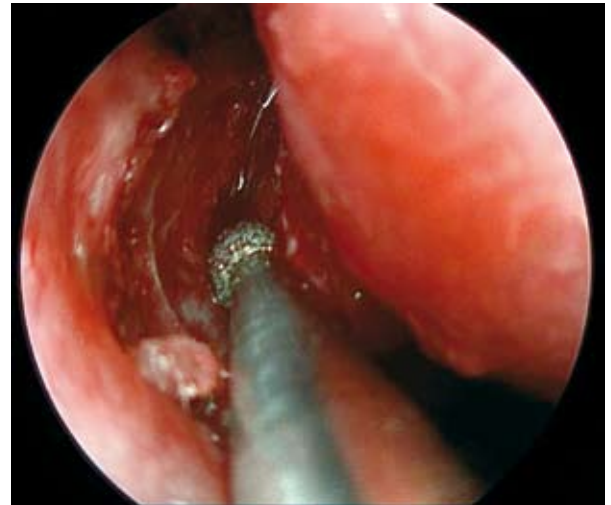
**Фиг. 2.** Отстраняване на костта върху сака с помощта на костна кюрета



**Fig. 2.** Removal of the bone onto the lacrimal sac using a bone curette



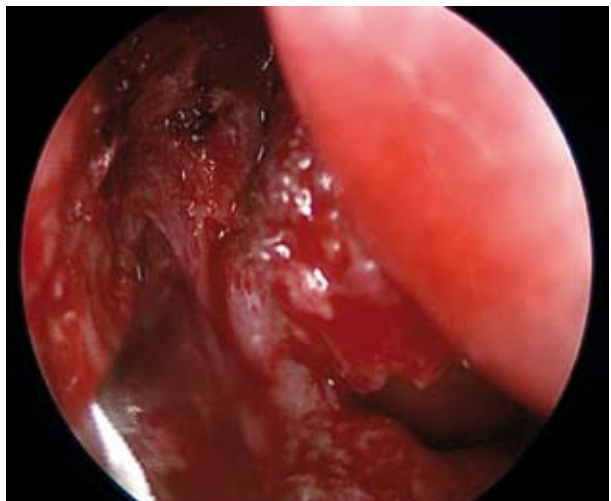
**Фиг. 3.** Отстраняване на костта чрез издрилване



**Fig. 3.** Removal of the bone onto the lacrimal sac using a drill



**Фиг. 4.** Марсупиализация на лакрималния сак



**Fig. 4.** Marsupialization of the lacrimal sac



## Нашият опит

Общо 11 пациенти с хронична обструкция или стеноза на назолакрималния канал са лекувани в клиниката от 2010 г. до 2013 г. От тях осем са жени и трима – мъже. Девет пациенти са били с едностранни и двама с двустранни оплаквания. Всички пациенти са лекувани с ендоскопска дакриоцисториностомия. Постоперативно ние не прилагаме тампонада на носа и не стентираме марсупиализирания лакримален сак. В постоперативния период не използваме стероиден спрей.

При всички е постигната пълна резолюция на симптомите. Пациентите са проследени на третия и шестия месец постоперативно. Пациентите имат право на повторен преглед в случай на настъпване на рецидив. До този момент това не е наблюдавано.

## Заклучение

Нашият опит показва отлични резултати при използването на ендоскопска дакриоцисториностомия за лечение на стеноза или обструкция на назолакрималните канали и ние приемаме техниката за безопасна и ефективна в съответствие с резултатите, публикувани от други автори.

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## Our experience

A total of 11 patients with chronic obstruction or stenosis of the nasolacrimal duct were treated at the clinic from 2010 to 2013. Of them, eight were female and three – male. Nine patients had unilateral and two – bilateral symptoms. All patients were treated with endoscopic DCR. Postoperatively we do not pack the nose, we do not stent the marsupialized lacrimal sac and we do not use a steroid nasal spray.

We achieved complete resolution of the symptoms in all patients. Patients were followed-up on the third and sixth month postoperatively. They also have an open follow-up appointment in case of recurrence of symptoms. So far this has not occurred.

## Conclusion

Our experience has shown excellent results from endoscopic DCR for the treatment of stenosis or obstruction of the nasolacrimal duct and we believe this technique to be safe and effective in accordance to the results published by other authors.

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# Клиничен случай на тромбоза на синус сигмоидеус и синус кавернозус и церебрит от отогенен произход

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*Отделение по УНГ-болести към МБАЛ - Пловдив*

**Резюме:** Описан е рядък случай на тромбоза на синус сигмоидеус и церебрит с отогенен произход при полиморбиден мъж на 68 години. Разгледани са диагностичните проблеми, терапевтичният подход и резултатите от лечението.

**Abstract:** A rare case of otogenic sigmoid sinus thrombosis in a male 68 years old polymorbid patient is described. The diagnostic problems, therapeutic approach and the results of the treatment are being presented.

## Въведение

Тромбозата на сигмоидния синус е смятана за често усложнение на инфекциите на средното ухо в началото на миналото столетие със смъртност, достигаща 100% при нетретирани случаи. В ерата след широкото навлизане на антибиотиците в практиката честотата на това усложнение намалява значително, а смъртността е сведена до около 10%. Общата смъртност при тромбоза на сигмоидния синус достига 30%, като най-честа причина е септичната кардиомиопатия, острият респираторен дистрес синдром и гърчове. Резистентността на патогенните микроорганизми към антибиотици в наши дни е считана за основна причина за отново нарастващата честота на тромбозата на сигмоидния синус като усложнение на острите и хронични отити.

## Представяне

Мъж на 68 г. постъпва в УНГ-отделение с оплаквания от болки в лявото ухо от около 2 месеца. Провел амбулаторно лечение с перорални антибиотици, без клиничен резултат.

## Introduction

At the beginning of the last century sigmoid sinus thrombosis was a common complication of middle ear infections, with lethality close to 100% in untreated patients. In the age of antibiotics the prevalence of this complication significantly diminished and lethality dropped to 10%. Overall lethality by sigmoid sinus thrombosis reaches 30% with septic cardiomyopathy, acute respiratory distress syndrome and seizures being the most common cause of death. Antimicrobial resistance is considered main reason for raising numbers of sigmoid sinus thrombosis as a complication of acute and chronic otitis.

## Presentation

68 year old man was admitted at our department with complaints of pain in the left ear for the last 2 months, treated with peroral antibiotics without any result.





## Обективно

От прегледа се установи умерено оточна и палпаторно болезнена горна част на паротидната жлеза вляво и оток на долната стена на ляв външен слухов проход.

*Отоскопия* – Помътнена тъпанчева мембрана, без категорични данни за остро възпаление на средното ухо.

*Аудиометрия* – комбиниран тип хипакузис двустранно.

*Параклиника* – WBC: 11,1; RBC: 4,0; HGb: 127; СУЕ: 113

*Микробиологично изследване на ушен секрет* – изолира се *Klebsiella pneumoniae*.

*Придружаващи заболявания* – ИБС, КМП, стенокардия, АХ гр. II, СН II-IIIФК, преживян долен МИ, ЗД 2 тип, преживян тромбофлебит на долни крайници, обезитас, диабетна ретино- и полиневропатия.

## Диагноза

Постави се работна диагноза *otitis externa circumscripta sinistra*; диференциална диагноза – тумор на паротидната жлеза.

## Терапевтичен подход

Осъществи се инцизия на кожата на долната стена на външния слухов проход, при която не се попадна на гнойна колекция. Взе се материал за хистологично изследване, който показва кръвен съсирек с елементи от церумен. Осъществи се тънкоиглена биопсия на паротидната жлеза – без резултат. Проведе се медикаментозно лечение: Medocef 2x1 g; Clindamycin 2x600 mg; Amikacin 2x500 mg; Ciprinol 2x300 mg; Perfalgan 2x1 g. Оплакванията на пациента персистираха.

Осъществи се КАТ на задна черепна ямка и мастоидите – КТ данни за МСБ, церебрална и церебеларна атрофия, без данни за огнищен възпалителен процес. Двустранно промени в темпорални кости, както при хроничен възпалителен процес – заличени и уплътнени клетъчни системи – по-изразено вляво.

## Examination

moderate swelling of the upper portion of left parotid gland with pain on palpation and swelling of inferior wall of external auditory meatus. Tympanic membrane is cloudy, but no clear otoscopic signs of middle ear infection.

„

*Audiometry*: mixed type hearing loss.

*Blood tests*: WBC 11,1 RBC 4,0 HGB 127 ESR 113

*Microbiology examination of ear swab*: *Klebsiella pneumoniae*

*Comorbidities*: IHD, Cardiomyopathy, Angina pectoris, Arterial hypertension, Myocardial infarction type 2, Thrombophlebitis of lower extremities, Diabetic neuropathy and retinopathy

## Working diagnosis

Otitis externa circumscripta

**Differential diagnosis:** Tu glandulae parotis

## Therapeutic Approach

Incision of the suspected furuncle of the inferior wall of external auditory meatus was unsuccessful, no collection was evacuated biopsy showed cerumen and coagulated blood.

Fine needle aspiration biopsy of parotid gland revealed no pathology.

Medicamental treatment applied: Medocef 2x1 g; Clindamycin 2x600 mg; Amikacin 2x500 mg; Ciprinol 2x300 mg; Perfalgan 2x1 g.

Patients complaints persisted.

CT scan of mastoids and posterior fossa was performed, showing signs of Cerebrovascular disease and cerebellar atrophy with no signs of focal inflammatory process of the brain. Bilateral alteration of temporal bones with signs of chronic inflammation.





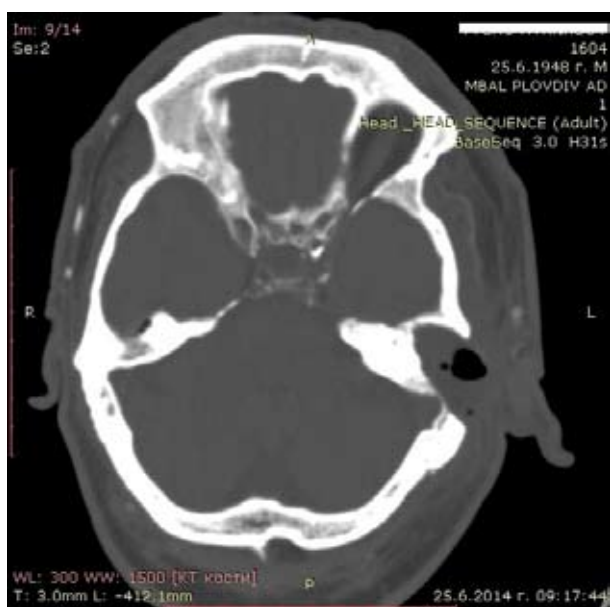
Пациентът се насочи за оперативно лечение в планов порядък, с препоръки за контрол на АН и кр. захар. След 8 дни пациентът се рехоспитализира и се осъществи радикална трепанация вляво – с ретроаурикуларен достъп по модификацията на Пайво се откри планум мастоидеум със задна стена на ВСП. С бормашина се свали кортикалисът на мастоидната кост, като се откри сину-дуралният ъгъл, синус сигмоидеус и дурата. Откри се епитимпанумът. Инкудостапедиалната става се освободи от обхващащите я грануляции. Свали се задната стена до нивото на канала на нервус фациалис, без да се отваря. Кожата на задната стена се сръза и се адаптира към кухината заедно с ламбо от мускулус окципиталис. По време на операцията се откри синус сигмоидеус в срединната му част. Осъществи се пробна пункция. Наложиха се геласпонова тампонада. Оперативното поле се затвори посредством

The patient was scheduled for surgical treatment. 8 days later the patient was rehospitalised and radical mastoidectomy of the left temporal bone was performed. After the sinus sigmoideus, the dura and the sinodural angle were revealed, sigmoid sinus was exposed in its middle part and exploratory puncture was performed, followed by gelfoam tamponade. Granulation tissues in the epitympanum, blocking the incudostapedial joint, were removed and the bony canal of the facial nerve was identified. Histological examination of tissues from middle ear showed chronic nonspecific inflammation. Postoperative care period passed without complications. 5 days after surgery the patient developed peripheral paresis of the facial nerve on the left side.

послойно обшиване. Направи се превръзка. Изпрати се материал за хистологично изследване, който показва хроничен неспецифичен отит. Следоперативният период премина спокойно, беше извършван редовен тоалет и смяна на превръзките. Оперативното поле беше спокойно. На петия ден след операцията се установи пареза на нервус фациалис от периферен тип.

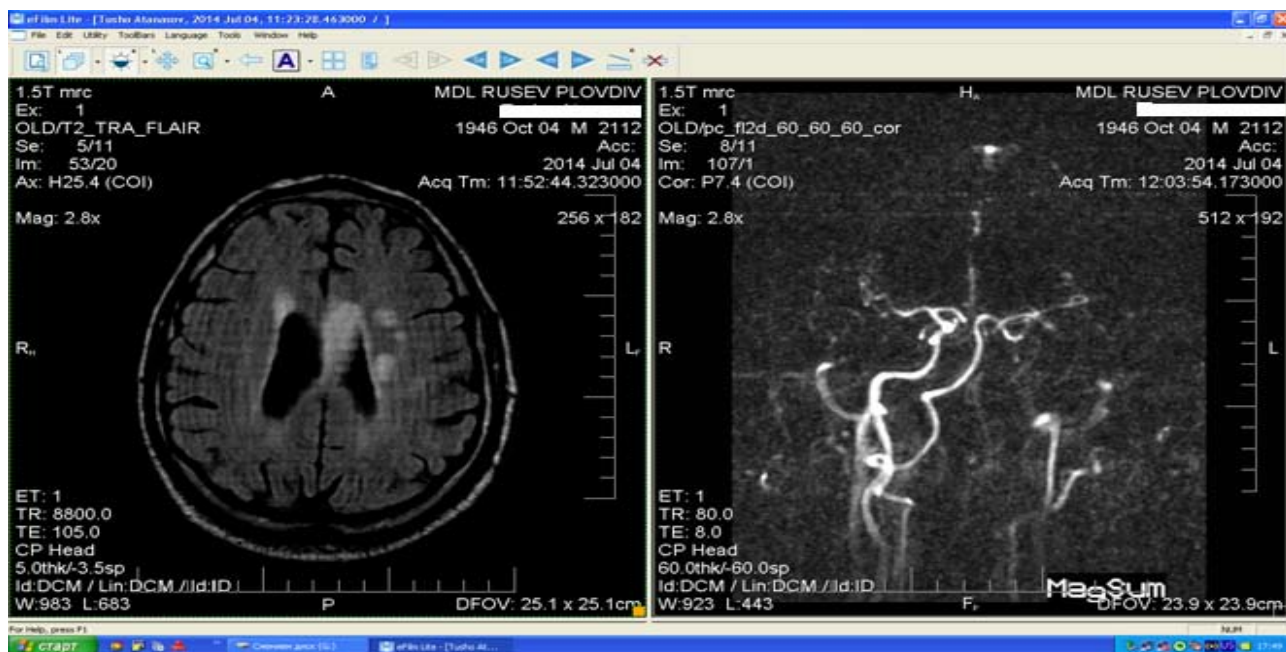
Извърши се КАТ на главен мозък и задна черепна ямка – състояние след левостранна мастоидектомия. Няма КТ данни за пресни огнищни лезии от исхемичен и хеморагичен характер. ХМСБ, мозъчна атрофия от сенилен тип.

Another CT scan was performed showing the usual outcome of radical mastoidectomy without complications and no signs of focal ischaemic or haemorrhagic lesions of the brain tissue.



Пациентът съобщаваше за периоди на главоболие и стягане във врата, гадене и повръщане. Общото състояние на пациента се влоши, стана сомнолентен. Имаше периоди, в които даваше неадекватни отговори на зададените му въпроси. Появи се десностранна хемипареза. Осъществи се консултация с кардиолог, невролог и ендокринолог, които коригираха антихипертензивната и антихипергликемичната терапия. Параклиничните резултати показаха данни за активна инфекция – WBC – 13,2; CRP- 76,8; ESR – 150.

The patient reported headache, stiffness in the neck, nausea. His general condition worsened and he became somnolent with periods of confusion. Signs of right sided hemiparesis appeared. Consultations with cardiologist, neurologist and endocrinologist were made in order to adjust his antihypertensive and antihyperglycemic therapy. Blood tests were suggesting the persistence of an active infection – WBC – 13,2; CRP- 76,8; ESR – 150. MRI of the brain with induction of with contrast matter was performed and cerebritis was diagnosed, while also showing thrombosis of the left internal carotid artery, possibly a pre existing one.



Осъществи се ЯМР на главен мозък – церебрит, тромбоза на а. каротис интерна синистра с неясна давност, данни за тромбоза на синус сигмоидеус и синус кавернозус вляво.

Проведе се консултация с офталмолог – диабетна ретинопатия. Проведе се консултация с инфекционист. Осъществи се лумбална пункция без данни за бактериална или вирусна инфекция в ликвора. Направи се ЕХО кардиография без данни за ендокардит.

Проведе се следното медикаментозно лечение: Amikacin 2x500 mg за 22 дни; Meronem 2x1 g за 10 дни; Maxipime 2x1 g за 10 дни; Exomax 200 мг/24 ч за 11 дни; Clexan 2x0,4 за 11 дни, Mannitol 10% 2x 250 мг за 10 дни, Vancomycin 3x1 г за 9 дни; Biseptol 2x2 ампула за 11 дни, Melbec по 1 ампула дневно; Profenid по 1 ампула дневно; Milgamma N по 1 ампула дневно; Nootropil по 2 г дневно; Degan при нужда; ВСП; антихипертензивни и антихипергликемични медикаменти.

Параклиничните показатели започнаха да влизат в референтни стойности. Пациентът не съобщава за нови субективни оплаквания. При изписването персистират лезията на нервус фациалис от периферен тип вляво и десностранната хемипареза.

Unconvincing MRI evidence of of left cavernous and sigmoid sinus thrombosis were also presented. Another consultation with ophtalmologist confirmed the diagnosis diabetic retinopathy. Infectious disease specialist performed lumbar puncture, but the results of CSF examination did not confirm the suspicion of bacterial or viral neuroinfection. Echocardiography was performed to exclude endocarditis.

Following medicamentous treatment was applied: Amikacin 2x500mg for 22 days; Meronem 2x1g for 10 days; Maxipime 2x1g for 10 days; Exomax 200мг/24h for 11 days; Clexan 2x0,4 for 11 days, Mannitol 10% 2x 250мг for 10 days, Vancomycin 3x1г for 9 days; Biseptol 2x2амп for 11 days, Melbec 1амп daily; Profenid 1 амп per day; MilgammaN 1амп per day; Nootropil 2г per day; Degan when needed Results of paraclinical tests slowly returned to normal. The patient did not report any new complaints. The patient was discharged with persisting left sided paresis of the facial nerve and right sided hemiparesis.



## Заклучение

Познаването и ранната диагностика на тромбозата на кавернозния и сигмоидния синус е от изключителна важност, тъй като в преантibiотичната ера тези усложнения на ушните инфекции са били, почти без изключение, фатални. Образната диагностика е ключова за точна диагноза и планиране на оперативния подход. Дори в наши дни резултатите при лечение на тромбоза на синус сигмоидеус не винаги са задоволителни, въпреки агресивната терапия.

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## Conclusion

Knowing the symptoms and early diagnosis of cavernous and sigmoid sinus thrombosis is crucial, because in the preantibiotic age these complications of ear infections were almost without exceptions fatal. Imaging is key for diagnosing and planning the surgical approach. Even today when treating sigmoid sinus thrombosis the results are not always satisfying, no matter how aggressive the therapy is.

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# Sialoendoscopy in the diagnosis of parotid gland diseases

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## Abstract

In the last two decades, a new minimally invasive technique for precise diagnosis of major salivary gland diseases has been introduced. This method is called salivary gland endoscopy or sialoendoscopy. The present survey outlines the emergence of this effective and safe procedure as well as its clinical applications in the diagnosis of the

most common benign parotid gland diseases, i. e., chronic parotitis, including juvenile recurrent parotitis, and sialolithiasis causing major salivary gland obstructions.

**Key words:** diagnostic sialoendoscopy, chronic parotitis, sialolithiasis

## General characteristics of parotid gland endoscopy

Parotid gland endoscopy or sialoendoscopy is a minimally invasive technique for precise diagnosis of major salivary gland inflammations, obstructions, strictures and salivary stones. Most strictures are detected in the parotid duct and they accompany chronic recurrent sialadenitis.

Sialoendoscopy is usually performed under local anesthesia in an outpatient office. During the procedure, a small camera is placed into the parotid gland through the salivary ducts that empty into the mouth. The salivary duct opening needs to be either dilated or incised prior to introduction of the endoscope. Then saline is used to dilate the salivary duct and its branching. After endoscope introduction, the internal anatomy is explored for diagnosis of a specific disease entity. The endoscope is introduced into the gland through its natural orifice in the mouth or by a making a small incision in the duct opening. Nowadays, there is a variety of miniaturized endoscopic imaging tools, mainly of semirigid type.

According to J. M. Bruch and J. Setlur (2012), sialendoscopy is introduced in the early 1990s as a minimally invasive alternative to standard methods for diagnosis of inflammatory and obstructive parotid gland disease. Nowadays the advances in instrumentation allow its adaptation to the smaller salivary ductal anatomy in the pediatric population, too.

R. Konigsberger *et al.* (1990) and P. Gundlach *et al.* (1990) separately perform sialoendoscopy by introducing the endoscope into the major salivary glands. In France, P. Katz (1990) introduces the fiberscope for the examination of the salivary glands, and in 1991,

he applies a 0.8-mm flexible endoscope to diagnose salivary gland stones. P. Gundlach *et al.* (1994) comparatively evaluate the newly-introduced diagnostic procedure called salivary duct endoscopy (sialendoscopy) with sialography and x-ray imaging. Sialendoscopy is a new procedure for identifying the cause of obstructive symptoms with direct inspection of the efferent salivary duct system by means of a microendoscope. It is performed under local anaesthesia on an outpatient basis. O. Nahlieli *et al.* (1994) apply a rigid miniendoscope to diagnose major salivary gland obstructions.





## Sialoendoscopy in parotitis

Sialendoscopic findings in three children at a mean age of 9 years (range 6-11 years) with juvenile recurrent parotitis consist in a blanched stenotic duct with intraductal debris (9). In a retrospective descriptive case study of 50 children between 2003 and 2012, 33 boys and 17 girls aged 2-16 years with juvenile recurrent parotitis diagnostic sialendoscopy reveals unilateral parotitis in 43 cases and bilateral one in seven patients (3). In a comprehensive review, the current literature devoted to the diagnostic outcomes after the application of sialendoscopy in juvenile recurrent parotitis patients is discussed (6).

Diagnostic pediatric sialendoscopy is carried out under local anesthesia in eight out of nine children older than eight years suffering from recurrent parotid swellings in an outpatient setting in Greece (18). Prior to endoscopy, a 4% xylocaine solution is applied on the papilla area for 15 min and intraductal injection of 5 mL 2% xylocaine solution is performed prior to endoscope insertion. The mean procedure duration is 39.2 min. Seven children tolerate and complete the sialendoscopic assessment. There are no major complications during the early post-endoscopy period. Four children do not present with swellings anymore, two children experience one recurrence each and one child needs a repeated sialendoscopy. Sialendoscopy findings show fibrinous debris in four, stenosis in three, mucous plugs in two children as well as evidence of sialodochitis with purulent debris in one child. Juvenile recurrent parotitis is diagnosed in six children and chronic microbial parotitis in one child. During the period from October 2002 to October 2011, 87 patients with parotid gland swelling are successfully studied using sialendoscopy (7). In 85 parotid glands, the main pathological finding in the duct is stenosis (n=64, 75%), mucus plug (n=12, 14%) and sialolith (n=9, 11%). On sialendoscopy there are several microstructures such as sublingual opening, a basin-like structure in the hilar region, a sphincter phenomenon and hyperplasia.

A retrospective review of 112 consecutive patients with obstructive salivary disorders who have undergone 134 unilateral or bilateral parotid gland sialendoscopies between December 2005, and August 2013 after preoperative computed tomography or magnetic resonance imaging indicates that in parotid lithiasis on preoperative imaging, at least one stone is found out on sialendoscopy in 63% of

the cases (16). At least one stone is found out on sialendoscopy in 63% of the patients with parotid stone on preoperative imaging while no stone is detected on sialendoscopy among the patients with negative preoperative imaging for stone. This suggests that parotid gland stones are not radiolucent on computed tomography imaging. The stones located anteriorly to the masseter are more successfully visualized on sialendoscopy when compared to those located posteriorly to the masseter. Anterior stones are more accessible for endoscopic management, whereas posterior ones require combined management approaches.

## Sialoendoscopy in sialolithiasis

The etiology of sialoliths is not fully understood yet. They result from the inorganic material build-up around an organic nidus in the duct or, less frequently, in the parenchyma of a salivary gland (19). Sialolithiasis, the formation of stones in the salivary gland, results in a mechanical obstruction of the salivary duct, causing recurrent glandular swellings during meals which are transitory, or complicated by bacterial infections accompanied by fever, purulent discharge at the papilla, and painful glandular swelling (1). The salivary stones occasionally form in a salivary gland or duct, usually by deposition of calcium salts around a nidus of organic material, and have a layered microscopic structure. When the stone becomes large enough to obstruct the salivary duct, saliva builds up especially during meal times when copious amounts of saliva are rapidly produced (12). This cyclic and chronic condition leads to a low-grade chronic inflammatory response in the ducts (sialodochitis) and/or parenchyma (sialadenitis). More importantly, obstruction persistence predisposes the gland to retrograde infections caused by saliva stagnation. They lead to acute painful sialadenitis that requires immediate attention and prescription of appropriate antibiotics. Sialolithiasis affects the major salivary glands as the parotid gland is less commonly damaged than the submandibular gland (in 5-10% of the cases only) (25). This is due to the long, tortuous upward path of the major duct and the nature and consistency of the submandibular gland saliva, which is thicker in consistency, rich in phosphorous and has a high pH that is conducive of stone formation (4).

The application of sialendoscopy establishes that among 530 consecutive multiple sialolithiasis



patients, the parotid gland is affected in four cases (to the right in three and to the left in one) (2).

During a retrospective study from 2004-2009 in Eastern Denmark, a total of 53 parotid endoscopies for diagnosis of non-neoplastic obstruction are performed (8). The indications for sialendoscopy are sialolithiasis, stenosis, recurrent swelling and recurrent infections. There is an overall success rate of 91% in the diagnostic endoscopies.

Between 1988 and 2002, a total of 1105 diagnostic endoscopies are performed on lithitic major salivary glands in France (15).

Among 80 patients with obstructive symptoms from the salivary glands the evaluation of the patient-perceived effect of sialendoscopy by applying the Glasgow Benefit Inventory Questionnaire demonstrates that this score predicts overall mean of 13.4 (95% CI=9.9-17.2) (22). Significant positive outcomes by multiple regression analysis are the presence of stones ( $p=0.015$ ) and parotid gland examination ( $p=0.041$ ).

Patient's satisfaction is evaluated after 52 sialendoscopies in 46 patients with obstructive disorders of the major salivary glands (20). Immediately after sialendoscopy, operative gland ablation is avoided in 98.1% of the patients. After a follow-up period of  $225.4 \pm 79.0$  days, it is done in 89.9% of the patients. There is an improvement of symptoms

during the follow-up in 85.2% of the patients. The values for role-physical functioning ( $p=0.025$ ) and bodily pain ( $p=0.011$ ) show a significant difference versus a matched reference group of healthy individuals. Younger age, long-term symptom duration and some questionnaire items such as vitality, social functioning and mental health are significant negative influence factors towards the outcome.

In a retrospective analysis of 43 patients, sonography, cone beam computed tomography and sialendoscopy together indicate sialolithiasis in 33 cases (24). Sensitivity and negative predictive value are the best in sialendoscopy (94% and 83%), followed by cone beam computed tomography (79% and 56%) and sonography (70% and 47%, respectively).

In a tertiary referral academic medical centre between 2003 and 2008, diagnostic sialendoscopy confirms 221 parotid gland stones (26).

Between January 1, 2003 and November 30, 2008, pediatric sialendoscopy allows the diagnosis of 12 patients with salivary duct lithiasis and of 21 ones with salivary duct stenosis (21). Preoperative ultrasonographic results are confirmed by sialendoscopy in seven patients with recurrent parotid gland swelling only. Only four out of ten patients with lithiasis found using sialendoscopy have been detected using preoperative ultrasonography.

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# Olfactory Disturbances in Parkinson's Disease

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## Abstract

Olfaction is not a leading sense in humans, but it plays an important role for the quality of life. The classical observations of Dr. J. Parkinson may state that senses and intellect remain intact, but it has been proven recently that 70% to 100% of patients with Parkinson's disease have olfactory disturbances. Complete loss of olfaction can be seen in half of the patients. The disturbances worsen significantly after Hoehn-Yahr stage II. Olfactory dysfunction is considered attractive as a potential biomarker for Parkinson's disease because of its high prevalence and easy assessment. It can also be useful for the

differential diagnosis with other extrapyramidal disorders. Studies give evidence of normal olfaction in patients with essential tremor, progressive supranuclear palsy and corticobasal degeneration, and normal or mildly impaired function in multiple system atrophy, unlike the moderate to severe impairment in Parkinson's disease.

**Keywords:** Parkinson's disease, olfactory disturbances, anosmia, neurodegeneration

The classical observations of Dr. J. Parkinson may state that senses and intellect remain intact, but it has been proven recently that almost all patients with Parkinson's disease have olfactory disturbances (5, 7).

Olfaction is not a leading sense in humans, but it plays an important role for the quality of life: it determines the aromas of foods and beverages and protects from close contact with dangerous substances. Impairments may influence body weight, as the pleasure that comes with food is a factor for appetite. That said, doctors may not pay enough attention to olfactory problems, while patients often don't realize or neglect them (25).

The first publication on the topic of olfactory disturbances in Parkinson's disease dates back to 1975 (Ansari and Johnson). Later, other authors confirm

olfactory dysfunction in 70% to 100% of patients: prevalence close to that of rest tremor, the most popular cardinal symptom of Parkinson's disease (2, 3, 12).

The identification of olfactory stimuli is a complex task requiring detection, pre-learned answer, and sensory processing in the piriform cortex, the hippocampus, the prefrontal cortex, the amygdala, and in some language areas (2). Impairment in Parkinson's disease encompasses perception and semantic processing. Discrimination, identification, and smell perception threshold are impaired to such extent that they can be demonstrated using standard qualitative methods. Olfactory disturbances appear long before motor symptoms and progress with time (20). Olfactory impairment is seen in virtually all patients with Parkinson's disease. Over 50% suf-



fer from anosmia, 35% have severe hyposmia, and in over 14% it is moderate (22). Impaired olfaction precedes the development of motor symptoms by at least one to five years. After five years the risk for healthy persons with olfactory disturbances to develop Parkinson's disease significantly decreases. Because of its high prevalence, olfactory dysfunction may even be regarded as a cardinal symptom of the disease (11).

A recent large multicenter study provided evidence of hyposmia in over 96% of patients with Parkinson's disease and in about 25% of the common population aged over 52 years (9). According to some authors the tremor form of the disease goes together with a relatively more preserved olfactory function (11, 12).

The symptoms of impaired olfaction are not specific but can be seen frequently in neurodegenerative disorders. Etiology and neuropathology are though specific, with the formation of Lewy bodies in Parkinson's disease and of amyloid plaques and neurofibrillary tangles in Alzheimer's disease. According to the model of Braak the olfactory bulb and the anterior olfactory nucleus are among the first structures affected by the pathologic process. The olfactory pathway enters the skull without additional synapsing, thus creating prerequisites for entry of toxic or infectious agents in the central nervous system. Different assumptions exist: for a prion-like or viral agent, spreading through nervous pathways, impairing olfaction first, and later the central nervous system, or for patients with primary hypo- or anosmia which doesn't allow them to exit an area with dangerous chemical substances. Unfortunately, proofs supporting such theories are not yet available.

Degeneration affects cortical structures as well: the olfactory tubercle, the frontal and temporal piriform cortex, the periamygdaloid and entorhinal cortex (4, 13, 14, 17).

Complete loss of olfaction can be seen in half of the patients with Parkinson's disease. It has been speculated that impairment of the cognitive appraisal of olfactory stimuli is also involved, but presently no options exist for in vivo differentiation of patients with impairment of the olfactory bulb from those with cortical olfactory deficit (8, 20).

The olfactory epithelium and the nasal mucosa do not differ from those in healthy persons. The olfactory bulb is reduced in size and in cell number according to some authors, but others state that it

is intact. An increased number of dopaminergic inhibitory neurons has been found there, possibly as a compensatory response to the cellular loss in the basal ganglia. Such increase may also explain the lack of efficacy of dopaminergic treatment on olfaction (1, 21).

Functional MRI assessment of olfactory processing in Parkinson's disease shows decreased neuronal activity in the amygdala and hippocampus. Alpha sinuclein can be found predominantly in the central rhinencephalon on pathologic assessment. These results support the thesis for selective impairment of the identification, memory and discrimination of olfactory stimuli with impairment of the cognitive processing, and not for ordinary threshold impairment, reflecting peripheral damage (11, 12).

Neurodegeneration and the formation of Lewy bodies play an important role for olfactory dysfunction, a proof for this being the confirmed olfactory disturbances in dementia with Lewy bodies and the normal olfaction in vascular Parkinsonian syndrome, MPTP-induced parkinsonism, or parkin-positive parkinsonism (20, 23).

When pleasant aromas are used as stimuli, decreased neuronal activity is observed in the thalamus and the amygdala in Parkinson's disease. Dysregulation of dopaminergic response to pleasant aromas also leads to the activation of ventral striatum and prefrontal lateral areas. The decreased perception of intensity most probably reflects the decreased activation of primary central olfactory structures such as the amygdala, while changes of perception for valence are due to impaired activation of ventral striatum and left prefrontal areas (16, 18).

Cholinergic denervation of the limbic archicortex is also a factor for anosmia. Degeneration of the cholinergic system develops early in untreated patients with Parkinson's disease and progresses with the appearance of dementia. Limbic denervation and cognitive deficit correlate with an increase of olfactory disturbances (3).

Atrophy of the limbic and paralimbic cortex, areas related to olfaction, has been found by means of MRI morphometry. Olfactory disturbances correlate significantly with atrophy of the right piriform cortex (primary olfactory area) in early Parkinson's disease and of the right amygdala (secondary olfactory area) in moderately advanced Parkinson's disease. Volume loss is not related to generalized brain atrophy, but represents a selective regional process. Piriform cortex plays an important role

for normal olfaction, not only in unimodal sensory processing, but also in learning, memorizing, and identifying olfactory stimuli. The amygdala takes part in olfactory perception also with the emotional appraisal of stimuli, which is significantly reduced in Parkinson's disease (26).

Regardless of the fact that impairment is due to damage of dopaminergic neurons in the olfactory bulb and the olfactory nuclei, they do not correlate with the severity of motor symptoms which also have dopaminergic mediation, and do not benefit from antiarkinsonian drugs. Most probably the lack of efficacy of dopaminergic treatment is due to the fact that olfactory disturbances develop in the beginning of the disease and progress irreversibly, long before the appearance of movement disorders, when the diagnosis can be established and treatment can be initiated (22).

Olfactory disturbances have initially been considered static, unrelated to the evolution of the disease, but it has been found later that they progress with the development of the pathologic process and correlate with the severity of Parkinson's disease. Even in patients *de novo*, assessed three times during a one-year period, progressive worsening of olfactory function has been demonstrated (20). Olfactory disturbances worsen significantly after Hoehn-Yahr stage II (15, 19).

It has been known that olfactory disturbances are selective. American studies have discovered that the greatest differences between patients and healthy persons are for the aromas of pizza, wintergreen, banana, petrol, pineapple, smoke and cinnamon from the short form of UPSIT, while in a German study banana and pineapple, but not cinnamon, are the most sensitive. Differences are possibly due to population and cultural specifics, which suggests the need for creation of different forms of the common tests (11, 12).

Correlation has been observed between anosmia and autonomic disturbances in Parkinson's disease with cardio-vagal and efferent sympathetic baroreflexory disturbance, postganglionic cardiac and selective extracardiac noradrenergic denervation. All these changes are independent of dopamine deficit in the striatum and are most probably due to a central and peripheral loss of noradrenergic neurons (10).

Despite the presence of hypo- or anosmia, olfactory hallucinations are seen rarely, and most often present with the feeling of a smell of burning rubber, grass, or rotting fish (6).

In order to diagnose hyposmia in Parkinson's disease, neuroimaging should be negative, trauma and local disorders should be excluded. Smoking significantly alters olfaction, but a significant part of patients with Parkinson's disease are non-smokers. A problem of retrospective studies is that patients tend to miss or neglect olfactory disturbances. An important number of them do not remember since when the changes have been present, and they may even recognize them for the first time during the interview (11, 12, 24).

Olfactory dysfunction is attractive as a potential biomarker for Parkinson's disease because of its high prevalence and easy assessment. One of the most widely used diagnostic tests is UPSIT (University of Pennsylvania Smell Identification Test) and its short version which can be used in persons outside the Western world. Another option is the Sniffin' sticks test (with aroma sticks for assessment of threshold, discrimination and identification).

Some authors discover preferential disturbance of the identification of olfactory stimuli, and not of their perception, a fact that again leads to olfactory memory. Dysfunction of the identification of olfactory stimuli correlates with the dopaminergic loss in the striatum (TRODAT SPECT) and with the sympathetic cardiac denervation (MIBG SPECT). In another study, 10% of close relatives with hyposmia and abnormal SPECT have developed Parkinson's disease in two years. This motivates some researchers, in order to increase specificity and sensitivity of the diagnosis, to recommend the combination of assessment of olfaction, functional assessment of the brain, and sonography of the *s. nigra*. Still, PET and SPECT are way too expensive to be used as screening methods.

Olfactory disturbances help a lot for the differential diagnosis with other extrapyramidal disorders. Some authors even recommend the diagnosis of Parkinson's disease to be revised in patients with Parkinsonian syndrome but with normal olfaction. In qualitative assessment difficulties can be found only in patients with multiple system atrophy, but quantitative assessment provides an immediate answer, because in multiple system atrophy the impairment is significantly milder. Nevertheless, in the instruction given by the American Academy of neurology it has been stated that assessment of olfaction may differentiate Parkinson's disease from progressive supranuclear palsy and cortico-





basal degeneration, but not from multiple system atrophy (20).

Olfactory disturbances have long been considered a potential premotor marker (Ansary and Johnson, 1975), and observations have discovered impairment in 41% of close relatives of patients with sporadic or inherited Parkinson's disease. The risk in such relatives for developing sporadic Parkinson's disease is also increased. Though olfactory dysfunction with different etiology can be seen in a large part of the common population, this symptom may aid the diagnosis of Parkinson's disease. Moreover, studies give evidence of normal olfaction in patients with essential tremor, progressive supranuclear palsy and corticobasal degeneration,

and normal or mildly impaired function in multiple system atrophy, unlike the moderate to severe impairment in Parkinson's disease (22).

When theoretically determining the risk in relatives of patients with Parkinson's disease or in the common population, ethical issues should not be disregarded, despite the positive expectations (20).

The presence of olfactory disturbances is well-known in Parkinson's disease. They have been studied extensively and are frequent and easy to assess. These facts support the application of their assessment as one of the markers for establishing the diagnosis even in the early stages of the disease.

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## Maxillofacial surgery in patients with obstructive sleep apnea and snoring

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### Abstract

The present survey systematizes the modern foreign literature devoted to the recent advances in the surgical management of the patients with obstructive sleep apnea and snoring. The results from the application of a variety of contemporary methods are briefly described. A special attention is paid to the maxillomandibular advancement that represents the most common maxillofacial surgical

technique in this interdisciplinary field. The promising perspectives of multi-level surgery of the upper airway for obstructive sleep apnea are mentioned, too.

**Key words:** obstructive sleep apnea, maxillofacial surgery, surgical techniques, maxillomandibular advancement

Obstructive sleep apnea is a relatively common sleep breathing disorder that is popularly associated with snoring and excessive daytime sleepiness. A surgical approach to its treatment remains an area of intense debate, both within and without the surgical community itself. Although continuous positive airway pressure therapy remains the gold standard for the treatment of obstructive sleep apnea, surgery may be indicated to facilitate conservative management and/or improve compliance in cases where the latter is poorly tolerated.

G. Dimitroulis (1997) reviews the role of the oral and maxillofacial surgeon in the recognition and management of this disorder. According to this author, surgery of the upper airways includes uvulopalatopharyngoplasty and partial glossectomy while specific maxillofacial surgery incorporates geniogloss advancement (or geniotomy) and/or hyoid suspension; advancement genioplasty; mandibular advancement and/or advancement genioplasty as well as maxillomandibular advancement and/or advancement genioplasty.

Historically, tracheostomy is the first surgical modality used for the treatment of obstructive

sleep apnea that has proved effective in bypassing the impaired pharyngeal airway. In 1981, the first uvulopalatopharyngoplasty is carried out in obstructive sleep apnea (2). It increases the pharyngeal cross-sectional area and decreases pharyngeal collapsibility (3). An enlarged tongue (macroglossia) calls for tongue reduction surgery extending from the midline of the posterior tongue down to the free margin of the epiglottis. The recognition of the importance of tongue position leads to the application of orthognathic surgical principles to obstructive sleep apnea management (4). The technique of geniogloss advancement is developed for advancing the tongue forwards without changing the lower facial esthetics or the dental occlusion where mandibular dimensions are normal (5). In case of deficient chin, the standard advancement genioplasty ensures esthetic advantages and brings forward the anterior digastric muscle attachments thus effectively providing the forward traction to the hyoid bone and opening-up the hypopharyngeal airway (1).

Mandibular advancement surgery using bilateral sagittal split osteotomies is effective in obstructive sleep apnea patients with horizontal mandibu-



lar deficiency (class II skeletal base) who do not respond to conservative therapy and uvulopalatopharyngoplasty (6).

Although bimaxillary advancement surgery has been originally reserved for obstructive sleep apnea patients with major skeletal deficiencies, the simultaneous advancement of both the maxilla (Le Fort I downfracture osteotomy) and mandible (bilateral sagittal split ramus osteotomy) is becoming a more popular surgical approach to these patients who have failed to respond to other treatment modalities (1).

B. T. Kotecha and A. C. Hall (2014) summarize the current range of surgical treatment options together with the evidence base for their intervention in otolaryngology, maxillofacial and bariatric surgery. According to the surgical site, these authors consider nasal, oropharyngeal, hypopharyngeal, maxillofacial, tracheal and gastric surgical techniques for obstructive sleep apnea. They outline the importance of the radical palatal surgery, the uvulopalatopharyngoplasty, the laser assisted palatoplasty, the radiofrequency thermotherapy of the soft palate and the tongue base, the hyoid suspension, the midline glossectomy, the epiglottic wedge resection, the minimally invasive palatal and tongue base surgery, and the transoral robotic surgery. The advantages of tracheostomy consist in the fact that it bypasses the obstructive segment and remains highly efficient although being invasive and difficult in obese individuals. The bariatric Roux-en-Y gastric bypass provides objective improvement and decreases continuous positive airway pressure while the vertical handed gastroplasty ensures further health benefits (7).

The multi-level surgery of the upper respiratory tract presents with undoubted benefits and efficacy and is a promising option for further progress. Here we should mention the hypoglossal nerve stimulation (8) as well as the hyoid suspension (9, 10), the tracheostomy (11), the bariatric surgery (12) and the maxillomandibular advancement.

According to H. D. Ephros et al. (2010), the most commonly performed surgical procedures for snoring and obstructive sleep apnea include nasal reconstruction, uvulopalatopharyngoplasty, advancement genioplasty, mandibular osteotomy with genioglossus advancement and hyoid myotomy and suspension. In more severe cases, maxillomandibular advancement with advancement genioplasty is indicated.

In a systematic review in *MEDLINE* and *Cochrane Library* databases with meta-analysis, 21 randomized controlled trials are identified. They deal with maxillomandibular advancement or without with counterclockwise rotation in patients with obstructive sleep apnea (14). There is a statistically meaningful decrease of postoperative apnea-hypopnea index and a statistically meaningful increase of postoperative lowest oxygen saturation values.

Maxillomandibular advancement produces statistically significant airway morphology improvements such as postoperative airway length and airway minimum cross-sectional areas in obstructive sleep apnea patients (15).

The subjective outcomes and use of continuous positive airway pressure after maxillomandibular advancement surgery for obstructive sleep apnea syndrome are evaluated by a self-administered questionnaire completed pre- and postoperatively by 116 patients (16). Surgery is very effective as it decreases snoring by 83%, witnessed apneas by 94% and continuous positive airway pressure use by 96% ( $p < 0,001$ ). The results from a retrospective study of 265 patients with obstructive sleep apnea syndrome and an extremely high apnea-hypopnea index score suggest that this technique is a highly successful one-stage surgery as it eliminates the use of continuous positive airway pressure, improves subjective outcomes and considerably decreases the apnea-hypopnea index score ( $p < 0,001$ ) (17).

In a prospective randomized study on treatment of obstructive sleep apnea syndrome, anterior-inferior mandibular osteotomy with the purpose of stretching the suprahyoidal muscle is performed in 10 men aged 20 to 65 years, without cardiovascular or neurologic disease, with normal maxillomandibular relation, and with an apnea index between 5 and 25 (18). Initially, there is decreased daytime sleepiness and less snoring after surgery, while after 12 months, apnea index, apnea/hypopnea index, oxygen desaturation index and cephalometric analysis do not show any positive results.

Mandibular retropositioning with or without maxillary advancement is done in a retrospective cohort of 26 patients with sleep-related breathing disorders (19). If this intervention is by  $\geq 5$  mm, it decreases the posterior airway space below 11 mm (in 30,75%;  $p = 0,03$ ) and proves evidence of soft palate elongation by  $>32$  mm (in 15,39% of the cases;  $p = 0,037$ ). Postoperative polysomnography

displays a higher incidence of mild to moderate obstructive sleep apnea syndrome in patients after mandibular repositioning  $\geq 5$  mm (in 69,25%) compared to those with mandibular repositioning in combination with maxillary advancement (in 38,46% of the cases;  $p = 0,039$ ).

The analysis of 30 adult patients at a mean age of  $50,5 \pm 9,6$  years indicates that maxillomandibular advancement is a clinically effective and safe long-term treatment modality for most patients with moderate-to-severe obstructive sleep apnea as demonstrated by significant diminutions in apnea-hypopnea index, diastolic blood pressure and subjective sleepiness, with concomitant significant quality of life improvement (20).

In a retrospective cohort study of 88 obstructive sleep apnea patients undergoing maxillomandibular advancement, the volume of perioperative fluids administered is not significantly associated with increased hospital stay length; however, it might be related to the presence of postoperative complications (21).

During a 9-year study period, 25 obstructive sleep apnea patients have undergone maxillomandibular advancement and genial tubercle advancement (22). The mean maxillary and mandibular advancements (T1 versus T0) are 9,8 mm (range, 1,6-15,2 mm) and 10,85 mm (range, 6,3-15,8 mm), respectively. The maxillomandibular complex advancement by 10 mm remains stable at a mean follow-up period longer than two years and preoperative orthodontic treatment does not influence skeletal stability.

The maxillomandibular advancement improves systemic blood pressure in 51 obstructive sleep apnea subjects at a mean of  $44 \pm 8$  years and with a mean body mass index of  $29 \pm 3,4$  kg/m<sup>2</sup> – from  $131 \pm 12,6$  mm Hg down to  $127 \pm 12,5$  mm Hg;  $p < 0,001$ , particularly in those with established arterial hypertension (23). Thus such a surgery is more effective for this cardiovascular disease than other management modalities.

The following clinical recommendations when considering skeletal surgery in preadolescent obstructive sleep apnea patients are suggested (24): i) the decision criteria of maxillomandibular advancement surgery as definite treatment; ii) the proper surgical design for both maximal airway enlargement and esthetic improvement, and iii) the postoperative facial growth for long-term stability of airway function and skeletal improvement.

The current technique for large maxillomandibular advancements designed for obstructive sleep apnea utilizes plates, screws, Erich Arch Bar and suspension wires which are left in place for five-six weeks (25). Guiding elastics are worn for the first week. This new technique yields a success rate over 90% for patients with a body mass index  $< 40$  kg/m<sup>2</sup> and 81% for those with a body mass index  $\geq 40$  kg/m<sup>2</sup>. The large advancements during maxillomandibular advancement surgeries can help improve postoperative obstructive sleep apnea outcomes.

The anterior mandibular subapical setback osteotomy combined with bilateral sagittal split osteotomy in the treatment of selected obstructive sleep apnea patients enables maximal mandibular advancement, alleviates pharyngeal narrowing and minimizes the alteration to the mid facial profile that is associated with the traditional maxillomandibular advancement (26).

Mandibular wing osteotomy is carried out in 10 subjects at a mean age of  $37,8 \pm 7,26$  years with apnea-hypopnea index  $> 15$ , previously unresponsive conservative treatment for the obstructive sleep apnea, moderate to severe retrognathia and no suggested conventional orthognathic surgery because of dentition or lack of willingness (27). One year after operation, there is a significant change in the Epworth Sleepiness Scale score and in the apnea-hypopnea index as well.

The retrospective search in *PubMed* and in *Scopus* identifies 18 articles with 522 obstructive sleep apnea patients treated with three glossectomy techniques such as midline glossectomy, lingual plasty and submucosal minimally invasive lingual excision (28). The glossectomy significantly improves sleep outcomes as part of multi-level surgery in such adult patients, e. g. the apnea-hypopnea index ( $p < 0,0001$ ), the Epworth Sleepiness Scale score ( $p < 0,00001$ ), the snoring visual analogue scale ( $p < 0,0001$ ) and lowest O<sub>2</sub> saturation ( $p < 0,0001$ ). Surgical success rate is 59,6% and surgical cure is achieved in 22,5% of the cases.

A modification of the conventional genioglossus advancement previously described by R. W. Riley *et al.* (1987) consists in bone segment replacement at the mandibular basal bone rather than at the mid area of the symphysis (29). This means a linear movement that allows a greater advancement and avoids the rotation of the genioglossus muscle. The advantages of this surgical technique include great-





er effectiveness, stability, more pleasing esthetic outcome and reduction of potential complications. In 13 male obstructive sleep apnea patients at an average age of  $43,0 \pm 2,4$  years and with an average follow-up of  $18,0 \pm 3,6$  months, the combination of elliptical window genioglossus advancement, hyoid bone suspension and uvulopalatopharyngoplasty results in statistically significant differences between mean pre- and postoperative apnea-hypopnea index (28,3 versus 12,1;  $p < 0,05$ ) and Epworth Sleepiness Scale score (15,2 versus 6,3;  $p < 0,05$ ) (30).

In obstructive sleep apnea patients, upper airway may be opened by an advancement genioplasty, but this may compromise facial esthetics by over-projecting the chin prominence. A modified genioplasty is presented in order to overcome this difficulty (31). It enables a rotational repositioning allowing for advancement of the genioglossus attachments as well as it avoids an excessive projection of pogonion, which would otherwise result in an unfavourable profile.

Distraction osteogenesis is applied in 15 patients with obstructive sleep apnea and temporomandibular joint ankylosis (32). Rate of distraction is 1 mm/day for adults and 2 mm/day for children till the mandibular incisors are in reverse overjet. After distraction, Epworth Sleepiness Scale score improves from a mean of 10,25 to 2,25, apnoea-hypopnoea index – from 57,03/hour to 6,67/hour, lowest oxygen saturation – from 64,47% to 81,20%, average minimum oxygen saturation – from 92,17% to 98,19% and body mass index – from a mean of 18,26 kg/m<sup>2</sup> to 21,39 kg/m<sup>2</sup>.

This method is a less invasive surgical technique in the management of obstructive sleep apnea, secondary to temporomandibular joint ankylosis (33). It treats not only the sleep breathing disorder but also corrects the facial asymmetry at the same time.

Bilateral mandibular distraction osteogenesis for obstructive sleep apnea is used in 37 patients (34). Of them, 20 subjects are treated with external and 17 ones with internal distraction devices. The average mandibular elongation is 30 mm in the first group versus 22 mm in the second one, however, there is a greater risk for pin tract infection (27,5% versus 5,88%). In addition, pin loosening in 22,5% of the cases requires pin replacement or leads to reduced retention period. The internal devices have a precise and predictable vector of lengthening and

left less visible scars at the submandibular area, however, they carry the disadvantage of requiring a second operation for device removal.

The comparative evaluation of the effectiveness and safety of two tongue base suspension techniques (Repose(®) system and modified tongue base suspension) with or without uvulopalatopharyngoplasty in obstructive sleep apnea as reported in several studies covering a total of 413 patients indicates that modified tongue base suspension is associated with significantly higher success rates (73,7% versus 56,7%;  $p < 0,001$ ) (35). The results from the application of uvulopharyngopalatoplasty plus tongue base suspension with or without septoplasty in 61 obstructive sleep apnea patients demonstrate that the mean obstructive apnea duration is the sole variable with a significant and satisfactory area under the curve value ( $p = 0,003$ ) (36). The cutoff value is 26,75 sec with 71,4% sensitivity; 72,1% specificity; 88,0% positive predictive value and 46,9% negative predictive value. Univariate analysis reveals an association between surgical failure and mean obstructive apnea duration  $> 26,75$  sec, total apnea duration, lowest O<sub>2</sub> saturation, mean O<sub>2</sub> saturation, mean O<sub>2</sub> desaturation and oxygen desaturation index, although only mean obstructive apnea duration  $> 26,75$  sec remains an independent predictor for unfavourable outcome after adjustment for other confounders in multivariate analysis ( $p = 0,041$ ). Therefore, the patients with longer obstructive apnea duration are at risk of having surgical failure.

Transoral robotic surgery is a useful and effective tool in nine children at a mean age of 10,5 years (range, 5,2-18,5) years with obstructive sleep apnea/hypopnea syndrome associated with base of tongue and lingual tonsillar hypertrophy (37). There are statistically significant postoperative reductions of the apnea-hypopnea index ( $p \leq 0,05$ ), hypopneic events ( $p < 0,05$ ) and lowest oxygen saturation ( $p \leq 0,01$ ).

The subjective perception of facial appearance after maxillofacial surgery for obstructive sleep apnea is evaluated in 26 patients at a mean age of  $45 \pm 7$  years (38). Postoperatively, 14 patients (53,85%) indicate that their facial appearance has improved, four patients (15,38%) record a neutral score, and eight patients (30,77% of the cases) report a lower score. These ratings do not correlate with changes neither in the apnea-hypopnea index, nor in the Epworth Sleepiness Scale following surgery.



The results from a retrospective cohort analysis of 267 consecutive patients with obstructive sleep apnea reveal two early major medical complications after intrapharyngeal surgical management among 162 patients and four complications after extrapharyngeal surgery among the rest 105 patients (39). There are statistically significant differences only for mean age, apnea-hypopnea index, Epworth Sleepiness Scale score, minimum nocturnal oxygen saturation and body mass index between the surgical groups.

According to L. Spicuzza et al. (2015), the mandibular advancement devices, particularly if custom

made, are effective in mild to moderate obstructive sleep apnea. Uvulopalatopharyngoplasty is a well-established procedure if continuous positive airway pressure is not tolerated, whereas maxillomandibular surgery can be suggested to patients with a craniofacial malformation. A number of minimally invasive procedures to treat snoring are currently under evaluation. A multidisciplinary approach is necessary for an accurate management of the disease.

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**Dear Friends,**

On behalf of the 4th International Pediatric Sleep Association Congress in conjunction with the 14th Annual Meeting of Taiwan Society of Sleep Medicine and the 1st Conference of Asian Society of Sleep Medicine (IPSA 2016), we are extremely happy to invite you to participate in the Congress which will be held on March 10-13, 2016, in Taipei International Convention Center, located in the heart of Taipei, Taiwan. We sincerely hope the beauty of our city and the theme of our conference will attract you all.

IPSA 2016 serves as a premier event on the international calendar of pediatric sleep bringing together physicians, educators, basic scientists, sleep technician and clinical investigators from hospitals, industry, and academia to present and share the latest cutting-edge research results and innovative solutions in the related fields.

We believe you will have a fruitful and enjoyable time during your stay in Taipei based on our solid program and the hospitality of Taipei, Taiwan, known as "Formosa" ("beautiful Island" in Portuguese), as used by the Portuguese mariners centuries ago to describe Taiwan

We look forward to seeing you in Taipei, Taiwan in 2016!

Best Regards,

Dr. Yu-Shu Huang, Chair of IPSA 2016 and Local Organizer  
Dr. Daniel KK Ng, Co-Chair of IPSA 2016  
Dr. Oliviero Bruni, President of IPSA  
Dr. Chia-Mo Lin, President of Taiwan Society of Sleep Medicine



The Mediterranean Society of  
Otology and Audiology (MSOA)

# 15<sup>th</sup> International Meeting

28 - 30 April 2016

Cappadocia - Turkey

## INVITATION



**Dear Colleagues,**

Mediterranean Society of Otology and Audiology (MSOA) is an organization that supports scientific activities with a scientific journal and scientific meetings since its establishment in 1987. We are very pleased to announce that 15th International Meeting of The Mediterranean Society of Otology and Audiology will be organized in Cappadocia-Turkey on 28-30 April, 2016.

As in the past congresses, the scientific program will provide an ideal platform to share and discuss the latest advances in Otology and Audiology. Moreover, current standards will be reviewed with distinguished otologists and audiologists.

Three plenary panels about the cochlear implantation, vestibular diagnostic tests and middle ear surgery will follow the plenary lectures. Moreover, round tables, short communications and panels on otology, neurotology and audiology will enrich our scientific program. Hands-on-courses will be held with a limited number of participants.

We are also pleased to inform you that the best video presentation and free paper will be awarded in the 15th International Meeting of The Mediterranean Society of Otology and Audiology. Cappadocia is considered one of the natural wonders of the world. Chimney rocks, cave houses and churches, underground cities and open-air museum attract a lot of visitors from all over the world. Moreover air ballooning and trekking in Ihlara Valley, Monastery Valley (Guzelyurt), Urgup and Goreme are very popular activities. Half-day tour will be planned in these areas in the social program besides other activities. Webpage of the 15th International Meeting of The Mediterranean Society of Otology and Audiology (<http://www.msoa2016.org/>) is being update regularly.

We are honoured to invite you to the 15th International Meeting of The Mediterranean Society of Otology and Audiology, which will take place in Cappadocia-Turkey, 28-30 April 2016. We are looking forward to welcoming you in order to make an unforgettable congress together.

Prof. Dr. S. Armagan Incesulu





Глубокоуважаемые коллеги!

Приглашаем Вас принять участие в работе

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Организаторы конференции: Первый Санкт-Петербургский государственный медицинский университет им. акад. И.П. Павлова,  
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Конференция пройдет под эгидой Международной Академии Оториноларингологии-Хирургии Головы и Шеи (IAO-HNS)

**Заявки на участие в конференции, пожалуйста, высылайте до 15 февраля 2016 года** в **технический комитет** конференции.

**Заявки на доклад с названием докладов (8 мин.) на английском языке, пожалуйста, высылайте до 15 февраля 2016 года** в **научный комитет** конференции.

**Abstract/Тезис (1 стр.)** на английском языке для публикации в материалах конференции в журнале "Folia Otorhinolaryngologiae et Pathologiae Respiratoriae", пожалуйста, высылайте **до 15 марта 2016 года** в **научный комитет**. Оформление в соответствии с требованиями к рукописям, направляемым в журнал "Folia Otorhinolaryngologiae et Pathologiae Respiratoriae" ([www.foliaopr.spb.ru](http://www.foliaopr.spb.ru))

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# 10<sup>th</sup> Balkan Congress of Otolaryngology, Head & Neck Surgery

*2-5 June, 2016*

*Tirana, Albania*



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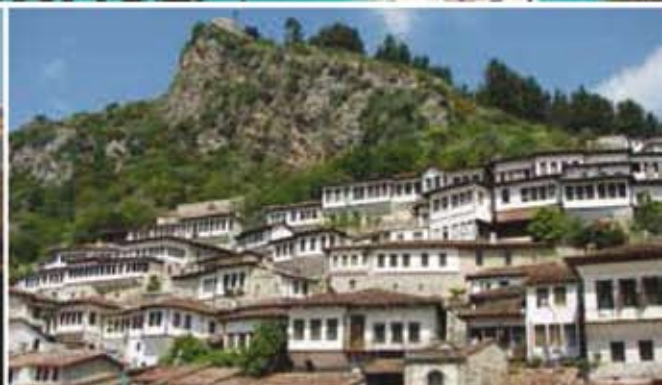
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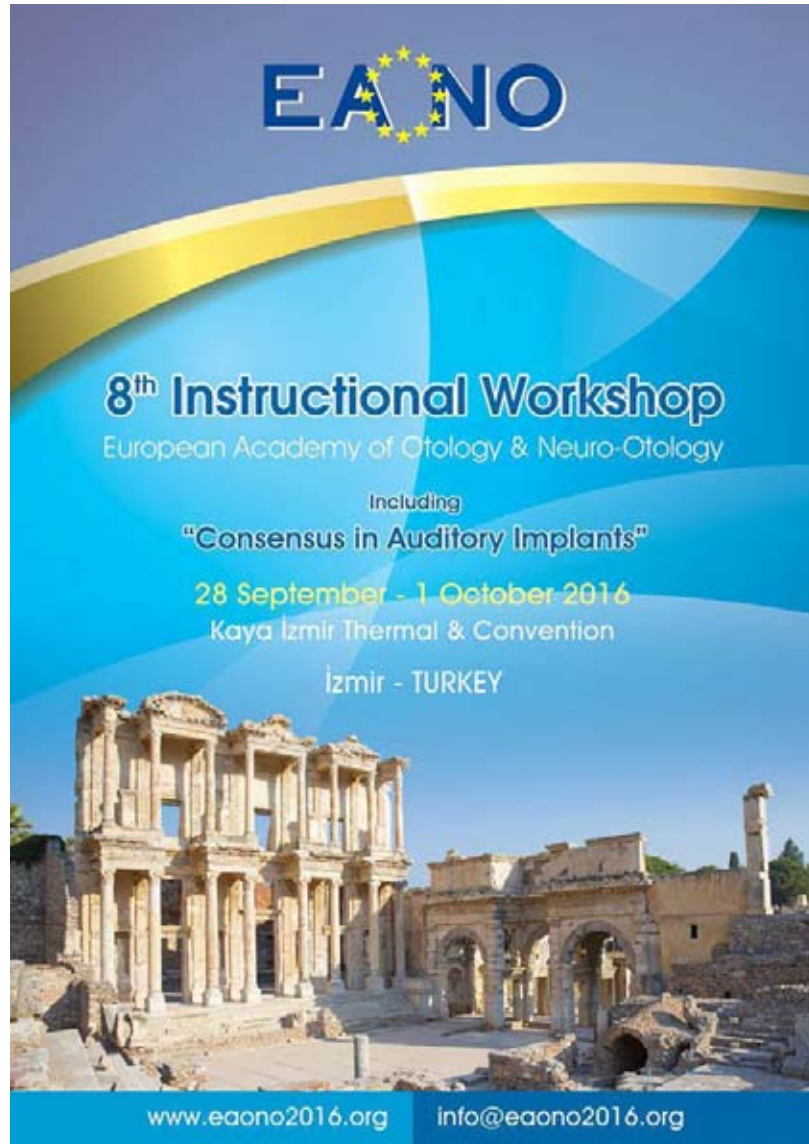
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**Dear Friends,**

The next EAONO Instructional Course will be organized in Izmir on **28 September – 1 October 2016**. Traditionally the instructional courses will be the main theme and will be presented by the remarkable European Otologists as well as the invited speakers from other Continents. Besides; Research sessions, „Residents Sessions” as already initiated in Siena; Plenary Sessions and Panels will be part of it. Of course the „Consensus on Auditory Implants” will couple with the scientific sessions.

The Temporal Bone Dissection Courses will take part in two different formats. Registrations will be received either for advanced dissection to be accomplished by using full cadaver heads or for basic dissection on temporal bones to take place in two different anatomy departments.

We shall be regularly updating the webpage [www.eaono2016.org](http://www.eaono2016.org) for the details and also will keep on mailings through the EAONO Online Forums.

Until then, please keep in touch.

Prof. O. Nuri Özgirgin  
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# ПРАКТИЧЕСКИ НАРЪЧНИК ПО ОТОРИНОЛАРИНГОЛОГИЯ



Издательство **СТЕНО**

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*„Littera scripta manet“*

В настоящото практическо ръководство по оториноларингология разглеждаме най-често срещаните заболявания на ушите, носа и гърлото, включително и тези на органите в шията, които често създават диагностични затруднения. В ръководството са представени и подробно описани редица консервативно-терапевтични и хирургически оперативни техники при някои остри животозастрашаващи състояния и заболявания с подходящия за тях алгоритъм на поведение и последователност на лечебни действия.

Подробното разглеждане на някои патоморфологични особености на редица болестни единици и тяхното отражение върху функциите на различните системи и органи допринася в предлаганата оториноларингология за етиопатогенетично свързване между клиничните прояви на заболяванията, подпомага лесното запаметяване на типичните прояви на отделните клинични единици. По тази причина предлаганото ръководство по оториноларингология според нас е подготвено и може да се използва като

стандартен учебник за студенти по медицина, дентална медицина, за специализиращи УНГ-болести и общопрактикуващи лекари, а предлаганият към ръководството набор от тест изпитни въпроси е изключително подходящ за студенти, провеждащи следването си по цикличната система на обучение, което е общоприет стандарт за Европейската общност. С последното подчертаваме европейската насоченост на предлаганата от нас оториноларингология, където изпитите се провеждат единствено и само с тест. За написването на настоящата практическа оториноларингология ни беше необходим твърде дълъг период от време, през което се промениха редица обстоятелства в областта на патофизиологията, фармакологията, хирургическите техники и други, което отчасти беше отразено в текстовете, което според нас не намалява актуалността на ръководството. Познавайки добре състоянието и липсата на подобна универсална литература по оториноларингология, ние го препоръчваме на колегите, като сме далеч от мисълта за безпогрешност и липса на пропуски, поради което ще възприемем със задоволство всички добронамерени и гравивни забележки.

**От авторите: проф. д-р Иван Цанев  
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