

---

ANNALES  
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA  
LUBLIN - POLONIA

VOL.LX, SUPPL. XVI, 438

SECTIO D

2005

---

Klinika Otolaryngologii, Wojskowy Instytut Medyczny w Warszawie<sup>1</sup>  
Military Institute of Medicine, Department of Otolaryngology, Warsaw  
Oddział Laryngologii, Wojewódzki Szpital Dziecięcy, Warszawa<sup>2</sup>  
Department of Otolaryngology, Children's Hospital, Warsaw

PIOTR RAPIEJKO<sup>1</sup>, BEATA ZIELNIK-JURKIEWICZ<sup>2</sup>, DARIUSZ JURKIEWICZ<sup>1</sup>

---

*Vomeronasal organ occurrence in adult humans*

---

**Narząd lemieszowo-nosowy u ludzi dorosłych**

The influence of chemical substances (feromones) on human emotional and physical condition has fascinated psychologists, sexuologists and laryngologists since centuries. Literature conveys inconsistent information on vomeronasal organ occurrence in humans. vomeronasal organ was described in 1703 by a Dutch doctor Ruyasch. Only over 100 years later, in 1811, Jacobson found this organ in animals (4).

Names of both the scientists have permanently coupled with vomeronasal organ. This organ is often called Jacobson's, and 2 symmetrical openings leading into it, located on both sides of septum, are called Ruyasch's ducts. Ruyasch's and Jacobson's work had been forgotten for many centuries (9). Since recently, vomeronasal organ in humans had been claimed to be vestigial (atrophic), and found in adults only sporadically (1). Existence of vomeronasal organ lined with main olfactory epithelium (MOE) in human fetuses aged between 12 and 23 weeks was described (3). However, studies performed in week 36 stated that this organ was lined with respiratory epithelium only. Kodis described in some human fetuses presence of accessory olfactory bulb (AOB) connected with vestigial vomeronasal organ by a vomeral nerve (6). He also claimed accessory olfactory bulb to become atrophic since the second trimester of pregnancy, and cease to exist after 5th month of pregnancy. Small openings of blind ducts have usually 0.1 to 0.5 mm in diameter and, thus, are difficult to assess without surgical microscope or endoscope. Development of endoscopy, common usage of magnifying glasses on one's nose and surgical microscopes during surgical and diagnostic procedures rendered search for vomeronasal organ in humans an easy task. The organ comprises of a short (2 – 8 mm) duct ended with a olfactory-like epithelium. Although the presence of a nerve connecting this organ with brain was not unequivocally confirmed, it is possible that this still is the undiscovered terminal nerve which hypothetically ends in hypothalamus (8,9,10).

**AIM**

The aim of the study was to analyze vomeronasal organ occurrence in humans in relation to age and sex.

**MATERIAL**

The study was conducted in a group of 482 patients, both men (259) and women (223), aged 18-79 years (mean age 43), admitted to the our hospital due to different causes and patients who underwent laryngological consultation assessing counterindications of eye surgery.

## METHOD

All patients underwent routine ENT examination including rhinoscopy, nasal cavity examination with usage of 2.5x magnification lens (surgical glasses) and surgical microscope with 10x magnification. All persons had nasal cavities examined endoscopically with rigid endoscopes with 0, 30 and 70 degree view. Every time presence of vomeronasal organ openings, along with localization, size and symmetry of these was noted. Digital camera recording was performed every time for opening size analysis and data archivization. Persons, who presented Jacobson's organ, were asked to fill a questionnaire concerning influence of smells on erotic sensations and, in reverse, if sexual arousal evokes e.g. sneezing.

## RESULTS

Vomeronasal organ was present in 221 persons, that is, 45,9%.

In 87% of cases vomeronasal organ opening size was smaller than 0.2 mm, what restricted its visibility to usage of magnifying lens, microscope, or endoscope. In 12,2% of cases only vomeronasal organ ducts openings were well visible in routine rhinoscopy without magnification.

Results are presented in table 1 and table 2

**Tab. 1 Vomeronasal organ (Ruyasch's ducts) occurrence**

|     |         | Vomeronasal organ visible (Ruyasch's ducts) |                      |            |             |            |
|-----|---------|---|----------------------|------------|-------------|------------|
|     |         | Rhinoscopy                                  | 2,5x magnifying lens | Endoscope  | Microscope  |            |
| VNO | present | 221 (45,9%)                                 | 27 (12,2%)           | 72 (32,5%) | 218 (98,6%) | 221 (100%) |
| VNO | absent  | 261 (54,1%)                                 | -                    | -          | -           | -          |

**Tab. 2 Localisation of Vomeronasal organ (Ruyasch's ducts)**

|                            |            |                      |             |            |
|----------------------------|------------|----------------------|-------------|------------|
| VNO present<br>221 (45,9%) | unilateral | together 182 (37,8%) | right-sided | 93 (19,3%) |
|                            | bilateral  | 39 (8,1%)            | left-sided  | 89 (18,5%) |

## DISCUSSION

Occurrence of vomeronasal organ in 45,8% of all examined patients is a fairly high outcome. In Trotier's studies, vomeronasal organ presence was confirmed bilaterally only in 8% of examined adults, while it was unilateral in 22% and absent in 70% (9), but in histological sections from cadavers Johnson et al. (3) identified vomeronasal cavity in 70% of nasal septa.

In our studies, symmetrical (bilateral) vomeronasal organ openings were present in 39 (8,1%) of subjects. Vomeronasal organ was found more often in men than women. No differences in vomeronasal organ occurrence were found in different age groups. vomeronasal organ was significantly more rare in patients with nasal septal deviation. In these cases, vomeronasal organ was usually found unilaterally, in all the cases on the concave side of deviated nasal septum. Small diameter of vomeronasal organ openings causes part of vomeronasal organ presence cases possible to be detectable only by means of magnifying optics.

Questionnaire about erotic sensations yielded interesting results. In the study group of vomeronasal organ-positive persons, 15% admitted that sneezing accompanied sexual arousal. This symptom was confirmed only by 3% from vomeronasal organ-negative group.

73% of examined patients confirmed the clear connection between smells and their erotic sensations, while in 261 patients without presence of vomeronasal organ, only 8% agreed with that question. It seems quite odd, since it was proven, that feromones claimed to stimulate vomeronasal organ are odourless. However, results may indicate some relations between vomeronasal organ presence and more „primitive,, emotional reflexes.

Cortical olfactory centers are located in medial area of hemispheres, hippocampal gyrus and amygdala located deep within temporal lobe. Part of signals from olfactory receptors reach cortex, allowing for conscious olfactory perception, and part limbic system, evoking changes in behaviour and spatial orientation (6). Limbic system is one of phylogenetically old structures of forebrain, formerly included into smell brain. Its main function is to govern instinctive and emotional behavior. Cortical parts of limbic system are characterized by primitive architectonical structure called "allocortex,,. It is

allocortex, that is directly related to olfactory action (olfactory bulb and olfactory node). Amygdala consists from a series of nuclei. Those phylogenetically older are connected with smell brain, others, phylogenetically younger, participate in analysis of environmental stimuli towards their emotional meaning and regulate vegetative functions and motivation-instinctive reactions (alimentary and sexual). Following bilateral amygdalae resection tempering of aggressiveness and heightened sexual activity is observed. Amygdalae play an important role in defensive actions (flight, defense, avoidance), sexual and maternal behavior.

Despite vomeronasal organ is an accessory olfactory organ, it seems to have significant meaning, in humans also, through cooperation with olfactory organ, similarly phylogenetically old. Limbic system is a center for long term memory, too. That is why we remember scents even after several years, while memory of most visual and acoustic experiences lasts a few weeks (2). There is one more, very important difference between smell and other senses. Olfactory stimuli are subject to very limited conscious control, for they reach cortex independently from thalamus and neocortex, where other incoming stimuli are interpreted. Olfactory epithelial cells are where central nervous system touches directly the outer world. Olfactory epithelium is actually directly connected to olfactory bulb of the brain. Other senses do not have such direct access to central nervous system. Because of this, before we are aware of a smell, our subconsciousness has already received the signal and responded.

### CONCLUSIONS

1. Vomeronasal organ was found in 45,9 % of all examined patients.
2. Vomeronasal organ was more frequent in men
3. Presence of vomeronasal organ needs to be considered while nasal septal corrective surgery and plastic operations.

### REFERENCES

- Crosby EC. i wsp.: Correlative anatomy of nervous system. MacMillan Co, New York 1962.
1. Fisher H.: Anatomy of love. Fawcett Columbine. New York, 1992.
  2. Johnson A. i wsp.: Clinical and histologicalevidence for the presence of the veronasal (Jacobson's) organ in adult humans. J. Otolaryngol. 1985, 14: 71-79.
  3. Keverne EB.: Importance of olfactory and vomeronasal systems for male sexual function. Physiol Behav 2004, 83:177-187.
  4. Knöll B. i wsp.: On the topographic targeting of basal vomeronasal axons through slit-mediated chemorepulsion. Development, 2003, 130: 5073-82.
  5. Kodis M. i wsp.: Love scents. Dutton, New York 1998.
  6. Meredith M.: Human vomeronasal organ function: a critica review of best and worst cases. Chem. Senses 2001, 26: 433-445.
  7. Mundy NI., Cook S.: Positive selection during the diversification of class I vomeronasal receptor-like (V1RL) genes, putative pheromone receptor genes, in human and primate evolution. Mol. Biol. Evol. 2003, 20: 1805-1810.
  8. Trotier D. i wsp.: The vomeronasal cavity in adult humans, Chem. Senses 2000, 25: 369-380.
  9. Wirsig-Wiecmann CR.: Function of gonadotropin-relasing hormone in olfaction. Keio J Med. 2001, 50: 81-85.

## SUMMARY

The influence of chemical substances (feromones) on human emotional and physical condition has fascinated psychologists, sexuologists and laryngologists since centuries. Literature conveys inconsistent information on vomeronasal organ (VNO) occurrence in humans. This organ is often called Jacobson's, and 2 symmetrical openings leading into it, located on both sides of septum, are called Ruyasch's ducts. The aim of the study was to analyze vomeronasal organ occurrence in humans in relation to age and sex. The study was conducted in a group of 482 patients, aged 18-79 years. All patients underwent routine ENT examination including rhinoscopy, nasal cavity examination with usage of 2.5x magnification lens (surgical glasses) and surgical microscope with 10x magnification. All persons had nasal cavities examined endoscopically. Every time presence of vomeronasal organ openings, along with localization, size and symmetry of these was noted. Persons, who presented Jacobson's organ, were asked to fill a questionnaire concerning influence of smells on erotic sensations. Vomeronasal organ was present in 221 persons, that is, 45,9%. In 87% of cases vomeronasal organ opening size was smaller than 0.2 mm, what restricted its visibility to usage of magnifying lens, microscope, or endoscope. In 12,2% of cases only vomeronasal organ ducts openings were well visible in routine rhinoscopy without magnification. Vomeronasal organ was found more often in men than women. VNO was significantly more rare in patients with nasal septal deviation. In these cases, vomeronasal organ was usually found unilaterally, in all the cases on the concave side of deviated nasal septum.

## STRESZCZENIE

Od wieków psychologów, seksuologów a także laryngologów fascynują zagadnienia związane z wpływem lotnych związków chemicznych (feromonów) na stan emocjonalny i fizyczny człowieka. W literaturze spotykamy sprzeczne informacje dotyczące występowania narządu lemieszowo-nosowego (VNO) u ludzi. Narząd ten zwany jest często narządem Jacobsona, zaś 2 symetryczne otwory prowadzące do tego narządu, znajdujące się po obu stronach przegrody zwane są kanałami Ruyascha. Celem badań była analiza występowania narządu lemieszowo-nosowego u ludzi w zależności od wieku i płci. Badania przeprowadzono w grupie 482 pacjentów obojga płci w wieku 18-79 lat. U wszystkich chorych przeprowadzono rutynowe badanie otolaryngologiczne z uwzględnieniem rynoskopii, rozszerzone o badanie jam nosa przy wykorzystaniu lupy (okularów operacyjnych) 2,5x powiększającej oraz mikroskopu operacyjnego z powiększeniem 10x. U wszystkich badanych wykonano badanie endoskopowe jam nosa. Każdorazowo odnotowywano obecność otworów VNO ich lokalizację, wielkość, symetryczność występowania. U osób u których stwierdzono obecność narządu lemieszowo-nosowego przeprowadzono badanie ankietowe, pytając o wpływ zapachów na doznania erotyczne. Obecność narządu lemieszowo-nosowego stwierdzono u 221 co stanowi 46,3% badanych. W 87 % przypadków wielkość otworu VNO była mniejsza niż 0,2 mm co powodowało, że był on dobrze widoczny jedynie przy zastosowaniu lupy, mikroskopu lub endoskopu. Jedynie w 12,2% przypadków otwory kanałów VNO były dobrze widoczne w rutynowym badaniu rynoskopowym bez użycia optyki powiększającej. VNO stwierdzano częściej u mężczyzn niż u kobiet. Statystycznie znamienne rzadsze występowanie VNO stwierdzono w grupie chorych ze skrzywieniem przegrody nosa. Przy czym w tych przypadkach zwykle VNO występował jednostronnie, we wszystkich przypadkach po stronie wklęsłej skrzywionej przegrody nosa.