Septoplasty – Predicting the Outcome

Lars Pedersen

Department of Otorhinolaryngology, Head and Neck Surgery
Institute of Clinical Science, Sahlgrenska University Hospital
Sahlgrenska Academy, University of Gothenburg

UNIVERSITY OF GOTHENBURG

Gothenburg, 2023

Cover illustration: *"The human nose"*, Artwork by Goodfairyart

Septoplasty – Predicting the Outcome

lars.pedersen@citysjukhuset.se

ISBN 978-91-8069-015-7 (PRINT)
ISBN 978-91-8069-016-4 (PDF)

Printed in Borås, Sweden, 2023
Printed by Stema Specialtryck AB

To my wonderful wife Cecilia and our three children Filip, Juni and Ines

Septoplasty – Predicting the Outcome

Lars Pedersen

Department of Otorhinolaryngology, Head and Neck Surgery

Institute of Clinical Science, Sahlgrenska University Hospital

Sahlgrenska Academy, University of Gothenburg
Gothenburg, Sweden

ABSTRACT

Septoplasty is one of the most common surgical procedures at ENT clinics around the world. The reason for undergoing a septoplasty is nasal airway obstruction (NAO) that does not respond to any other treatment. The most common medical management includes topical nasal spray (corticosteroids), saline rinsing and perhaps nasal strips physically to alleviate obstruction. In most material published on septoplasty, men are overrepresented. Around 70% of the patients are usually men and the mean age at surgery is 35-40 years. Since the results of septoplasty vary a lot, with a satisfaction rate ranging from under 50 % in some material up to around 90 %, the purpose of this thesis was to try to find predictors of a better outcome.

Methods/results: Paper I, a register study based on material from the Swedish National Septoplasty Register (SNSR). We aimed to study predictors of a better outcome six months after surgery. Including almost 6,000 patients, we found that higher age, surgery at small hospitals and no unplanned visits to the hospital postoperatively predicted a better outcome. **Paper II**, a register study with material from the updated SNSR including 888 patients. When comparing patients' severity of nasal obstruction pre- and 12 months postoperatively, we found that the nasal obstruction improved in 63% of the patients. Patients with severe nasal obstruction preoperatively improved the most at follow-up. **Paper III**, based on material including 366 patients operated on by a senior surgeon at one clinic. The Nose-VAS improved significantly for all patients after surgery. Septoplasty and septoplasty + turbinoplasty relieved nasal obstruction more effectively than turbinoplasty alone. **Paper IV**, material from the SNSR

during a period of six years (2014-2019), including 2,532 patients and focusing on gender differences between male and female patients undergoing septoplasty. When analysing preoperative PROMs and postoperative outcome between genders, we found the results were very similar for all the included patients.

Conclusion: Higher age and no unplanned postoperative visits within the first month after surgery predict a better outcome after surgery. Severe nasal obstruction preoperatively predicts a better outcome after surgery. The reason for the overrepresentation of men in septoplasty material remains unclear and no gender differences were seen comparing gender pre- and postoperatively.

Keywords: Nasal obstruction, outcome, PROM, septoplasty, turbinoplasty

ISBN 978-91-8069-015-7 (PRINT)
ISBN 978-91-8069-016-4 (PDF)

POPULÄRVETENSKAPLIG SAMMANFATTNING PÅ SVENSKA

Denna avhandling började som ett sökande efter faktorer som kan hjälpa oss prediktera vilka patienter som har störst nytta av en operation på näsown skiljeväggen (septumplastik). Septumplastik är en av de vanligaste ingrepp på Öron Näsa Hals-kliniker världen över. Indikationen är bestående nästäppa, som inte svarar på annan behandling (oftast kortisonnässpray) och vanligast rör det sig om ensidiga problem. Detta är således en andningsförbättrande operation, där man rättar till nässkiljeväggen och skapar mer plats på den sidan som är trång. I samband med septumplastik tar man ofta bort delar av näsmusslan (konkaplastik) för att skapa ytterligare utrymme för näsandning. Problem med nästäppa kan påverka livskvalitet, bland annat i form av snarkning och dålig sömn med påföljande trötthet och nedsatt livskvalitet. En sned nässkiljevägg kan vara medfött eller en följd av trauman mot näsan. Män är överrepresenterade i gruppen som opereras med septumplastik.

Metoder: I *arbete I, II och IV* har vi använt data från Septumplastikregistret i Sverige (SNSR), som är ett av flera register inom ÖNH-specialiteten. Registret startades 1997, och reviderades 2012-2013. Bland annat införde man längre uppföljningstid och uppdatering av ett antal frågor med mer precis frågeformulering. Registret innehåller data från små och stora operationsenheter runt om i hela landet. Rapportering till registret är inte obligatorisk, och på senare år rapporteras 50–60 % av alla septumplastiker som görs i Sverige till registret. *Arbete I* är baserat på en 10-årsperiod från den första delen av registret, medan *arbete II* och *IV* är från den uppdaterade delen av registret (efter 2013). *Arbete III* bygger på ett unikt material från en klinik utanför Oslo (Askim), där samma erfarne ÖNH-kirurg har träffat patienterna innan operation, opererat och slutligen gjort en uppföljning efter tre till sex månader.

Resultat: I *arbete I* visar vi att högre ålder vid operation och inga oplanerade återbesök första två veckorna efter operation är gynnsamt för resultatet efter septumplastik. I *arbete II* såg vi att patienter med svår nästäppa innan operationen hade störst effekt av septumplastik. Också här var högre ålder kopplat till bättre resultat efter operationen. *I arbete III* såg vi att septumplastik och septumplastik + konkaplastik gav bättre resultat på nästäppa än konkaplastik enbart. Patienter med svår nästäppa innan operation, upplevde bättre resultat efter operation. I *arbete IV* fokuserade vi på skillnader mellan kvinnor och män innan och efter operation. Vi inkluderade 2532 patienter, men hittade inga könsskillnader vare sig i karakteristika eller operationsresultat.

LIST OF PAPERS

This thesis is based on the following studies, referred to in the text by their Roman numerals.

I. **Pedersen L, Schiöler L, Holmberg K, Ahlström Emanuelsson C, Hellgren J**
Age and unplanned postoperative visits predict outcome after septoplasty: A national Swedish register study.
International Journal of Otolaryngology. 2018; 2018:2379536

II. **Pedersen L, Schiöler L, Finjan S, Davidsson Å, Sunnergren O, Holmberg K, Ahlström Emanuelsson C, Hellgren J**
Prognostic factors for outcome after septoplasty in 888 patients from the Swedish National Septoplasty Register.
European Archives of Otorhinolaryngology 2019 Aug;276(8):2223-2228.

III. **Pedersen L, Dölvik S, Holmberg K, Ahlström Emanuelsson C, Schiöler L, Hellgren J, Steinsvåg S**
Surgery to relieve nasal obstruction: outcome for 366 patients operated on by one senior surgeon.
European Archives of Otorhinolaryngology 2021 Oct;278(10):3867-3875.

IV. **Pedersen L, Holmberg K, Ahlström Emanuelsson C, Schiöler L, Steinsvåg S, Hellgren J**
A comparative study of men and women undergoing septoplasty – the Swedish National Septoplasty Register.
Submitted

CONTENTS

ABBREVIATIONS

ARIA	Allergic Rhinitis and its Impact on Asthma
BMI	Body Mass Index
CFD	Computational Fluid Dynamics
CT	Computed Tomography
ENS	Empty Nose Syndrome
ENT	Ear Nose and Throat
FNQ	Fairley Nasal Symptom Questionnaire
GBI	Glasgow Benefit Inventory
MRI	Magnetic Resonance Imaging
NAO	Nasal Airway Obstruction
NPR	(Swedish) National Patient Register
OR	Odds Ratio
OSAS	Obstructive Sleep Apnea Syndrome
PROM	Patient Rated Outcome Measurement
SD	Standard Deviation
SF12/36	12/36-Item Short Form health survey
SNSR	Swedish National Septoplasty Register
VAS	Visual Analogue Scale

1 INTRODUCTION

1.1 SEPTOPLASTY

1.1.1 History

Upon researching the history of septoplasty, descriptions of the procedure can already be found back in ancient Egyptian literature(1). Procedures for treating nasal fractures, such as plugging the nose with a grease-coated strut made of linen to keep the septum in place, are described. Together with applying rolls of linen or a splint to the outside of the nose to keep the external part of the nose stable and straight(2). In the early history of corrective procedures on nasal septal deviations, numerous techniques are outlined. In 1757, Quelmaltz described a technique to reposition the septum to the midline by applying digital pressure to the septum every day(3). In 1875, Adams published a paper describing a technique for septoplasty using a steel screw compressor to keep the septum in place and, after two or three days, this was replaced by ivory plugs giving support to the fractured septum with the goal of achieving a straighter confirmation(4). In Figure 1, a picture from Adams' original article can be seen, illustrating a method for treating nasal bone fractures and the recommendation was to use the device day and night for two to three weeks. In Adams' opinion, treating the broken nose and septum was neglected by the profession, although it often caused permanent problems, both cosmetic and functional, for the patients.

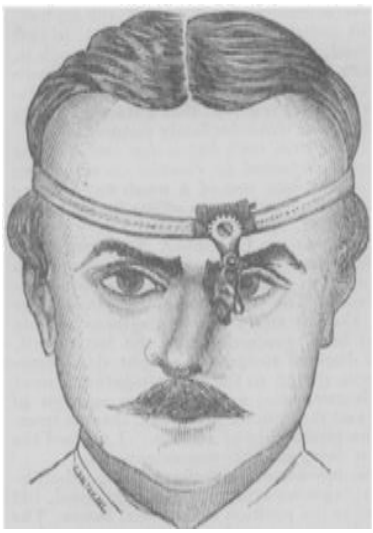
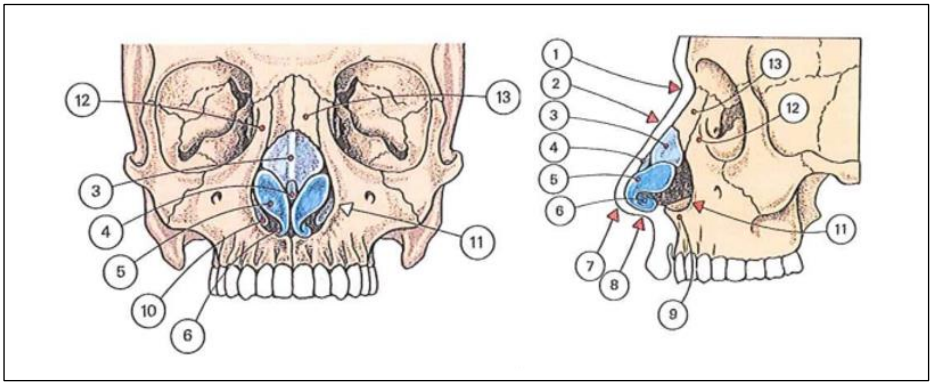


Figure 1. *"Nose-truss with screw pads". An image from Adams' original article, 1875.*

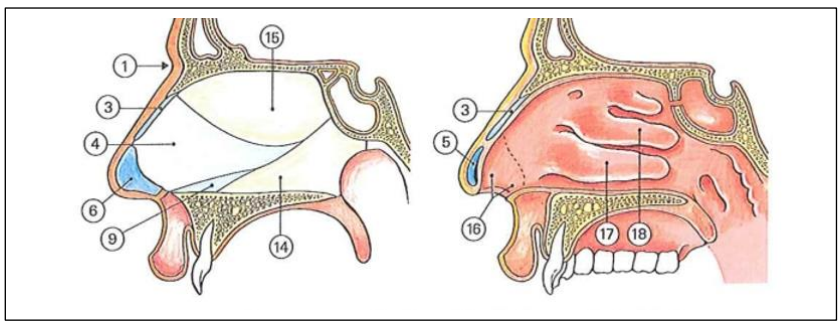
In 1882, Ingals published descriptions of the submucous resection of cartilaginous deformities, also known as “window resection”(5). In 1899, Asch described a technique where he broke down the tension in the deviated part of the cartilage, by making crossing incisions, to straighten the septum(6). This technique turned out to have no long lasting effect(7).

The start of the modern techniques we know today is described in the early 1900s, by Freer (1902) and Killian (1904)(5). Freer understood the importance of maintaining the support to the nose using an L-shaped piece of cartilage, known today as the L-strut, to avoid saddling deformity and retraction of the nasal tip(2). Since then, numerous variations of septoplasty techniques have been described.

1.1.2 Anatomy



1. Nasion 2. Rhinion 3. Lateral process of septal cartilage 4. Septal cartilage 5. Alar cartilage lateral crus 6. Alar cartilage medial crus 7. Nasal tip 8. Columella 9. Spina nasalis 10. Concha inferior anterior part 11. Apertura piriformis 12. Processus frontalis (maxilla) 13. Os nasale

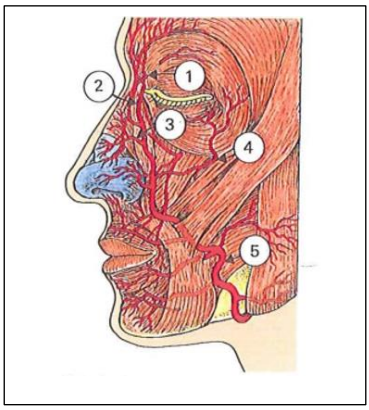


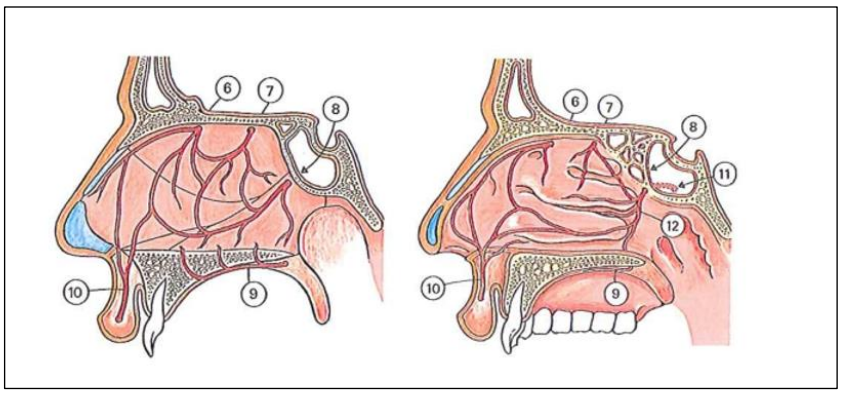
14. Vomer 15. Lamina perpendicularis 16. Vestibulum nasi 17. Concha inferior 18. Concha media. (Illustration *"Med kniven i näsan"*, Petruson).

The nasal septum performs important functions: giving structural support to the external nose and the nasal tip, dividing the nasal cavity into two parts and regulating airflow. The nasal septum consists of a membranous part anteriorly, followed by a cartilaginous part (quadrangular cartilage (*4*)) and an osseus component posteriorly (vomer (*14*)). The cartilaginous and bony components are covered with mucoperichondrium and mucoperiosteum, which provide innervation and vascular supply(8).

The **arterial supply** to the septum is both rich and complex. It comes from the external and internal carotid arteries, mainly via the anterior and posterior ethmoid arteries, and the sphenopalatine artery. The superior labial artery and the greater palatine artery are also involved(9).

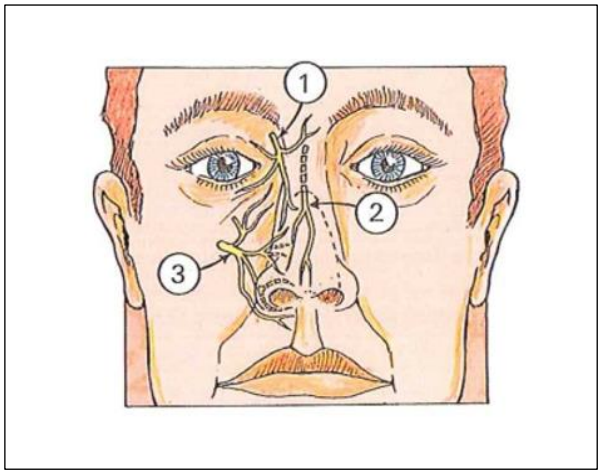
1. *Supraorbital artery*
2. *Dorsal nasal artery*
3. *Angular artery*
4. *Infraorbital artery*
5. *Facial artery*

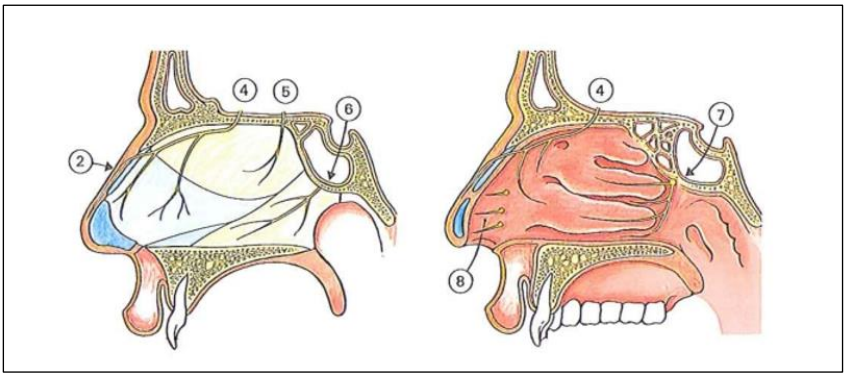




6. Ethmoid anterior artery 7. Ethmoid posterior artery 8. Sphenopalatine artery 9. Greater palatine artery 10. Labial artery 11. Maxillary artery 12. Palatine artery. (Illustration "*Med kniven i näsan"*, Petruson).

The innervation of the nasal mucosa includes both autonomic and sensory components. The degree of vascular tone, turbinate congestion and nasal secretion is regulated by the autonomic nervous system. The first and second division of the trigeminal nerve supply sensory innervation to the nasal mucosa(10).





1. Infratrochlear nerve 2. External branch of anterior ethmoidal nerve 3. Infraorbital nerve 4. Anterior ethmoidal nerve 5. Posterior ethmoidal nerve 6. Nasopalatine nerve 7. Pterygopalatine ganglion 8. Branches from the infraorbital nerve. (Illustration *"Med kniven i näsan"*, Petruson).

1.1.3 Surgical techniques in septoplasty

Many surgical approaches and techniques, including endonasal, endoscopic and open procedures, have been described over the years.

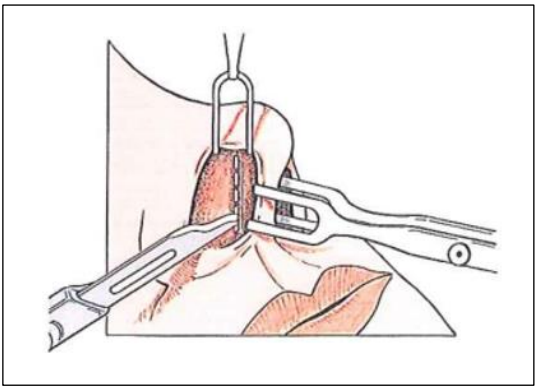


Illustration of the hemitransfixion approach. (*"Med kniven i näsan",* Petruson).

With the **hemitransfixion** approach, the incision is made through one side of the membranous side of the septum, anterior to the cartilaginous portion of the septum. The **Killian** incision is made 10-15 mm posterior to the caudal edge of the cartilaginous septum. Numerous other approaches, such as the Cottle Elevator Incision, Freer's incision and columella incision, to mention a few, are described in the literature. Moreover, *endoscopic septoplasty* is becoming more common and is now regarded as a good technique to use for many types of septal deviation, especially in the posterior and inferior area(11, 12). Endoscopic septoplasty is also helpful when teaching more junior surgeons, because of the enhanced visualisation, as it projects the procedure onto a monitor.

A *traditional septoplasty* is usually performed under general anaesthesia, using a headlight for visualisation. The nasal mucosa is decongested using topical lidocaine-nafazolin. One per cent lidocaine with adrenaline is then injected into the columella and along the septum bilaterally in a subperichondral plane. This assists with local anaesthesia, haemostasis and also hydrodissection. The next step is the hemitransfixion incision, using a scalpel with a 15 blade. The dissection is performed using scissors, followed by a Cottle or Freer elevator to dissect carefully within a subperichondral

plane and elevate the perichondrium and mucosa from the cartilage in an intact fashion. The dissection is continued broadly over and beyond the septal deformity. Nasal speculums of different sizes are used during this procedure to ensure adequate visualisation. The next step depends on the deviation or the issue with the nasal septum, usually using the elevator gently to incise and remove parts of the cartilage, releasing tension and being able to straighten the septum. It is important to preserve an adequate L-strut to prevent loss of external nasal support. The removed cartilage should be saved in normal saline. Pieces of cartilage can be reshaped and used to reinforce the L-strut, if necessary(8). When a satisfactory result is accomplished, the closure of the hemitransfixion incision is performed with a resorbable suture. A non-absorbable packing is then usually used; silastic nasal splints, cut to size, are applied on both sides of the septum. These are fixated with non-absorbable transseptal sutures, for easy removal in the outpatient clinic. The splints keep the pieces of cartilage in place and prevent adhesions to the turbinates. A silastic or portex tube (size 4.5-5.5) is then cut to size (8-9 cm) and placed in both nostrils to allow nasal breathing and keep the nasal splints in place. The tubes are kept in place with a non-absorbable suture through the columella. On top of the tubes, a piece of 2 cm ribbon gauze with Terracortril polymyxin B is placed, putting some pressure on the splints to prevent haematoma. The nasal packing is removed in the outpatient clinic after 7-14 days(13, 14).

1.1.4 Surgical techniques in turbinoplasty

Total turbinectomy is an area of debate and should generally not be performed, with the risk of ending up with the empty nose syndrome, causing excessive drying of the nose and crusting(10). Using the least invasive surgery possible to deal with the nasal obstruction is recommended(15). It is most common to perform a partial turbinectomy or a **turbinoplasty**, and as for the septoplasty there are numerous different techniques. **Outfracturing** (lateral displacement) of the inferior turbinate by using a long-bladed nasal speculum or a flat elevator is an alternative that is often used in combination with a septoplasty to improve nasal breathing(16). This technique was first described in 1904 by Killian(17). **Radiofrequency** treatment of the inferior turbinate is a minimally invasive technique to reduce the tissue volume with minimal impact on the surrounding tissue. In a review by Abdullah et al. from 2021 on surgical interventions for inferior turbinate hypertrophy, the results were promising for radiofrequency treatment, with studies reporting improved nasal breathing measured with rhinomanometry and improvement on VAS(18).

A *traditional turbinoplasty* is performed by injecting local anaesthesia (lidocaine with adrenaline) into the inferior turbinate, followed by an incision with a scalpel through the mucosa along the inferior border of the turbinate. This is followed by lifting the mucosal flap using an elevator, to expose the bony surface of the turbinate, followed by the removal of the bone anteriorly together with the redundant mucosa. The excess mucosa is then used to cover the bone of the inferior turbinate. To keep the mucosa in place and to prevent adhesions, a portex tube cut to size (8-9 cm long) is placed in both nostrils and kept in place by a single non-absorbable suture through the columella. For the septoplasty, a 2 cm ribbon gauze with Terracortril polymyxin B is placed in both cavities. The nasal packing is removed in the outpatient clinic after five to seven days(13, 19).

1.1.5 Complications

The most frequent complications in septoplasty are presented below(3, 8, 20):

- excessive bleeding
- septal haematoma
- septal perforation
- change in smell
- change in the shape of the nose
- infections
- nasal obstruction
- intranasal adhesions

In a systematic review by Van Egmond et al. in 2018, including eleven studies, only three reported complications(21). Septal perforation and adhesions or synechiae were the most frequent, with a reported incidence of seven (3%) and six (2.5%) respectively in 233 patients. Other complications were nasal septal haematoma and secondary haemorrhage. Complications were reported to a greater extent after septoplasty + turbinoplasty compared with septoplasty alone in all three studies.

In a large group of patients undergoing septoplasty or septoplasty + turbinoplasty, the authors found that 193 (3.4%) of 5,639 had some complication(20). Excessive bleeding was the most frequent (3.3%), followed by infection (3.1%), hyposmia (3.1%) and septal perforation (2.3%). Excessive bleeding is also reported to be the most frequent in other studies(22, 23).

To avoid complications, it is vital to secure good visualisation during surgery to be able to identify the anatomy, taking care when raising the mucosal flaps, to avoid tearing the mucosa. It is especially important to avoid bilateral tearing of the mucosa, damaging the blood supply with the risk of a septal perforation. Suturing the mucosa is usually not necessary, but it can sometimes be used to keep the edges together. If the nasal splints or tubes are sutured too tightly, there is a risk of ischaemia and necrosis of the surrounding area. It is important to advise the patient postoperatively about saline irrigation regularly for as long as they have the nasal packing to keep the tubes or splints clear and minimise potential crusting(20).

1.2 OBJECTIVE MEASUREMENTS OF NASAL BREATHING

1.2.1 Rhinomanometry (RM)

Active anterior rhinomanometry is one of the most commonly used methods for assessing nasal patency, measuring nasal pressure and airflow during normal inspiration and expiration. This is done using a probe placed in the nostril, testing one side at a time. The procedure is usually performed before and after topical vasoconstriction. Differences in resistance before and after decongestion can be attributed to nasal mucosal swelling. If there is no difference, the nasal stuffiness is likely to be caused by a structural issue. The procedure is relatively expensive and time consuming(24).

1.2.2 Acoustic rhinometry (AR)

Acoustic rhinometry is a measurement of nasal geometry, measuring echoes of sound impulses sent into one nostril. One nostril is measured at a time, providing information on the nasal luminal anatomic structures(24). AR determines the cross-sectional area and volumes of the nasal cavity as a function of the distance into the nasal cavity. The narrowest part of the nasal cavity is usually situated within three cm from the nares. Two areas are often referred to as narrow; one is the nasal valve and the other is the anterior end of the inferior turbinate. AR is good for testing one side at a time and is relatively easy to use, but it requires a trained operator(25).

1.2.3 Peak nasal inspiratory flow (PNIF)

Peak nasal inspiratory flow is a physiological measurement of the airflow through both nasal cavities during forced inspiration. The result is expressed in litres per minute. It is inexpensive, fast, easily portable and easy to perform. Since both sides are tested at the same time, it is not ideal for selecting patients for septoplasty. It can be used for comparisons of nasal breathing pre- and postoperatively(24, 26, 27).

1.2.4 Image-based volumetry

Like acoustic rhinometry, CT- or MRI-based volumetry uses cross-sectional areas measured on imaging to determine nasal passage(28). It is not commonly used to select patients for septoplasty.

1.2.5 Computational fluid dynamics

Computational fluid dynamics (CFD) can be used to simulate airflow through 3D reconstructions of nasal cavities on CT scans, providing detailed physiological variables using computer software(29, 30). CFD is not used regularly in the septoplasty decision process.

1.3 SUBJECTIVE MEASUREMENTS OF NASAL SYMPTOMS

1.3.1 SNOT 22 (Sino-Nasal Outcome Test)

The SNOT 22 is a validated questionnaire containing 22 questions on symptoms and the social/emotional consequences of rhinosinusitis. The grading of symptoms is related to both nasal and general health from 0 (no problem) to 5 (problem as bad as it can be). It can be broken down into eight "nasal" and 14 "general health" questions(31). It was originally designed for rhinosinusitis but can also be used for nasal surgery. Available in Swedish(32).

I.D.:_____ **SINO-NASAL OUTCOME TEST (SNOT-22)** DATE:_____

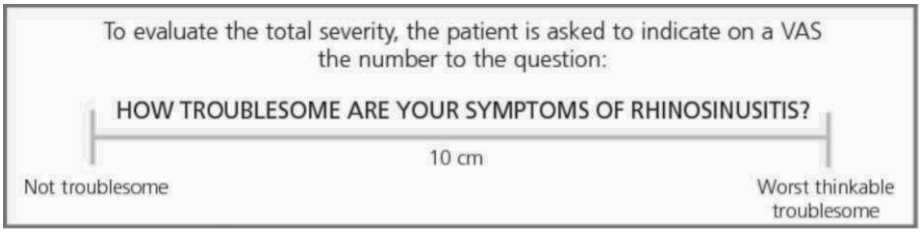
Below you will find a list of symptoms and social/emotional consequences of your rhinosinusitis. We would like to know more about these problems and would appreciate your answering the following questions to the best of your ability. There are no right or wrong answers, and only you can provide us with this information. Please rate your problems as they have been over the past two weeks. Thank you for your participation. Do not hesitate to ask for assistance if necessary.

1. Considering how severe the problem is when you experience it and how often it happens, please rate each item below on how "bad" it is by circling the number that corresponds with how you feel using this scale: →	No Problem	Very Mild Problem	Mild or slight Problem	Moderate Problem	Severe Problem	Problem as bad as it can be		5 Most Important Items
1. Need to blow nose	0	1	2	3	4	5		○
2. Nasal Blockage	0	1	2	3	4	5		○
3. Sneezing	0	1	2	3	4	5		○
4. Runny nose	0	1	2	3	4	5		○
5. Cough	0	1	2	3	4	5		○
6. Post-nasal discharge	0	1	2	3	4	5		○
7. Thick nasal discharge	0	1	2	3	4	5		○
8. Ear fullness	0	1	2	3	4	5		○
9. Dizziness	0	1	2	3	4	5		○
10. Ear pain	0	1	2	3	4	5		○
11. Facial pain/pressure	0	1	2	3	4	5		○
12. Decreased Sense of Smell/Taste	0	1	2	3	4	5		○
13. Difficulty falling asleep	0	1	2	3	4	5		○
14. Wake up at night	0	1	2	3	4	5		○
15. Lack of a good night's sleep	0	1	2	3	4	5		○
16. Wake up tired	0	1	2	3	4	5		○
17. Fatigue	0	1	2	3	4	5		○
18. Reduced productivity	0	1	2	3	4	5		○
19. Reduced concentration	0	1	2	3	4	5		○
20. Frustrated/restless/irritable	0	1	2	3	4	5		○
21. Sad	0	1	2	3	4	5		○
22. Embarrassed	0	1	2	3	4	5		○

2. Please mark the most important items affecting your health (maximum of 5 items)_____ ↑

1.3.2 VAS (Visual Analogue Scale)

The VAS is a psychometric response scale that is easy to use. It can be used to grade different parameters and nasal symptoms is one of them. A scale from 1-10 represented by a straight line, where higher scores indicate worse symptoms, is frequently used. The patients indicate their response using a cross on the line, corresponding to their own perception of symptoms(33). Lim et al. propose that, when it is used to grade chronic rhinosinusitis, VAS 0-3 is classed as mild, > 3-7 moderate and > 7 as severe(34). This grading can also be used for other nasal symptoms like nasal obstruction.



1.3.3 NOSE (Nasal Obstruction Symptom Evaluation)

The NOSE is a self-report instrument (questionnaire) to quantify the subjective burden related to nasal obstruction that contains five questions with a grading from 0 (not a problem) to 4 (severe problem)(33). A validated version is available in Swedish.

Nasal Obstruction Symptom Evaluation (NOSE) Instrument

→ **To the Patient:** Please help us to better understand the impact of nasal obstruction on your quality of life by **completing the following survey**. Thank You!

Over the past 1 month, how much of a problem were the following conditions for you?

Please circle the most correct response

	Not a problem	*Very mild problem*	*Moderate problem*	*Fairly bad problem*	*Severe problem*
1. Nasal congestion or stuffiness	0	1	2	3	4
2. Nasal blockage or obstruction	0	1	2	3	4
3. Trouble breathing through my nose	0	1	2	3	4
4. Trouble sleeping	0	1	2	3	4
5. Unable to get enough air through my nose during exercise or exertion	0	1	2	3	4

1.3.4 Glasgow Benefit Inventory (GBI)

The GBI is a validated, generic patient-recorded outcome measurement used in otolaryngology to report changes in quality of life post-intervention, medical or surgical, containing 18 questions. The score ranges from -100 (poorest outcome) through 0 (no change) to +100 (best outcome)(35).

1.3.5 Fairley Nasal Symptom Questionnaire (FNQ)

The FNQ is a validated 12-item measurement of nasal symptoms. The symptom intensity for each item is rated from 0-3, where 0 = asymptomatic, 1 = mild, 2 = moderate and 3 = severe(36).

1.3.6 Short Form 36 (SF 36)/Short Form 12 (SF 12)

The SF 36 is a 36-item patient-reported survey of patient health. Two distinct components are measured, a physical and a mental. It is therefore not appropriate to use one overall score, but rather two summary scores, according to the SF 36 developers(37).

The SF 12 is a shorter version of its predecessor, the SF 36, which is used as a measurement of general health. It was created to reduce the burden of response. The SF 12 has been studied in different patient populations. It has shown strong correlations with the SF 36 at group level, even though individual differences can be seen(38).

1.3.7 Which subjective measurement to use for septoplasty?

The SNOT 22, VAS and NOSE are the subjective methods most used in material on septoplasty.

A comparison of the VAS and NOSE in evaluations of post-septoplasty patients was made by Shukla et al. in 2020(33). It comprised 80 adult patients with nasal obstruction due to a deviated nasal septum and they all filled out questionnaires relating to the severity of their symptoms using the VAS (grading severity of nasal obstruction) and NOSE both preoperatively and postoperatively (1 and 3 months). Preoperatively, the scores for both methods were similar, with a significant correlation. Postoperatively, there was more improvement in the NOSE score at both one and three months. At three months, patient satisfaction was rated as 88% with the NOSE and 62% with the VAS. Both provide an effective framework for evaluating treatment

response. The VAS is easy and simple to use, but it is not as specific and does not include different aspects of nasal issues like the NOSE does.

Other studies using the VAS or NOSE with a longer follow-up period also show that they are both good tools for evaluating the response to surgery for the indication of nasal obstruction(39, 40).

In addition, when the VAS is used in published material, it usually contains *one question* on nasal obstruction. In Paper III, we used a version of the VAS containing twelve questions covering different aspects of nasal issues (Nose-VAS), giving us more information on patient complaints. The Nose-VAS is available in "Appendix".

Van Egmond et al. used both a disease-specific SNOT-22 and NOSE, among other subjective measurements, in their extensive RCT(41). They both showed consistently large effects in favour of septoplasty compared with the patients in their non-surgical management group, comparing pre- and postoperative results. They reported beneficial effects of septoplasty over the full 24 months of follow-up, with the largest difference at six months.

The questionnaire used in the **SNSR** is another subjective method for measuring *nasal issues*. The updated questionnaire (after revision) has a scale on which the patient has four options to grade their nasal obstruction from none to severe. The questionnaire also contains a question to assess the effect on *daily activity and sleep*, which has been adapted from the ARIA consensus document. Questionnaires from the SNSR used in paper I, II and IV are available in "Appendix".

There are numerous alternatives when it comes to subjective measurements of nasal obstruction and septoplasty outcome, or as a tool in the decision-making related to septoplasty. It is not possible to say that one is superior to the others and this is often a personal preference. The subject is further discussed in 1.5 "Selecting patients for septoplasty".

1.4 REGISTERS

1.4.1 Swedish National Septoplasty Register (SNSR)

The SNSR was started by the Swedish Association for Otorhinolaryngology, Head and Neck Surgery (SFOHH) in 1997. The register is monitored by an expert group of Swedish rhinologists and is funded by the Swedish Association of Local Authorities and Regions. The register underwent a total revision in 2012-2013(42).

The SNSR contains data on surgery to the nasal septum (septoplasty), where the main indication is nasal obstruction, and the goal is to improve the patient's nasal breathing. In the register, a septoplasty can be registered as a single procedure or combined with a turbinoplasty but not in combination with other nasal surgery like sinus surgery or rhinoplasty. The ENT clinics performing septoplasty, both public hospitals and private practices, report to the register on a voluntary basis(43, 44).

In the first part of the register (1997-2013), the main outcome *was patient-rated relief of symptoms six months after surgery*. During this period, the register contained three questionnaires. The first one was filled out by the ENT surgeon making the decision to perform septoplasty, while the second was filled out by the ENT surgeon performing the septoplasty and the third by the patient six months after surgery. In the third questionnaire, the patients grade their symptoms as follows: "My symptoms have gone", "My symptoms have almost gone", "My symptoms remain", "My symptoms have worsened" and

they also report unplanned visits to healthcare within the first two weeks due to pain, bleeding or infection(44).

Today (2013-), the register contains four questionnaires. The *first questionnaire* has two parts. The first is filled out by the patients, where they report their degree of nasal obstruction (none, mild, moderate, severe), side of nasal obstruction, day- and/or night-time symptoms and activity impairment (none, mild, moderate, severe) due to the nasal obstruction. The second part is filled out by the ENT surgeon diagnosing and making the decision to perform septoplasty and it contains data on diagnosis, side of septal deviation, co-morbidities, if rhinomanometry was used and planned surgical procedure. The *second questionnaire* is filled out by the ENT surgeon performing the surgery, including data on surgical technique, nasal packing, or use of antibiotics. *Questionnaire 3* is sent to the patient by mail or e-mail one month after surgery, asking about any unplanned visits to healthcare due to postoperative complications (bleeding, pain, infection, other) within the first month postoperatively. *Questionnaire 4* is also mailed or e-mailed to the patient, 12 months after surgery, again asking them to grade their nasal obstruction (none, mild, moderate, severe), as they did preoperatively, together with the impairment to daily activities and sleep caused by nasal obstruction. Further, they are asked whether the result was as expected and, finally, whether they suffered any unexpected adverse effects 12 months after surgery(42, 43).

1.4.2 Swedish National Patient Register (NPR)

The NPR was started back in 1967 and since 1987 it has had full national coverage. It is a mandatory register for all inpatient care and outpatient visits to a specialist physician in Sweden, excluding primary care. The register is a health data register that is regulated by Swedish law (1998:543) and it is governed by the Swedish Board of Health and Welfare (Socialstyrelsen). Each register should include the patient's social security number, primary and relevant secondary diagnosis, treatment, mechanism of injury when applicable, medical and administrative patient information(45).

1.4.3 Coverage of data

The data in the SNSR are validated by dividing the number of septoplasties registered in the SNSR by the total number of septoplasties performed in Sweden (using NPR + SNSR, one registration per personal identity number). The result is presented as a percentage for every year.

1.4.4 Completeness of data

The completeness of data is the number of patients reported to the SNSR by a clinic, divided by the real number of patients undergoing a septoplasty at the same clinic.

1.4.5 Why do we have healthcare quality registers?

The vision of the SKR for the healthcare registers in Sweden is that this will help save lives and contribute to equal care regardless of where people live. Moreover, it will be used actively in follow-up, learning, quality development, improvement, science and leadership(46).

1.4.6 Register-based research

In 2010, a report was presented in Sweden concluding that the Swedish national quality registers were regarded as a large underutilised resource for measuring the results of systematic quality improvement(47). This has led to increased attention being paid to register-based research and investments from the government for the years following the report.

The main strengths of register-based research, in this case the septoplasty register, are that data already exist and valuable time has passed, complete study populations minimise selection bias and the data are independently collected(48). Other strengths are that the data give an impression of "everyday life", many patients are included and different hospitals and different surgeons from all over the country are involved. It is also cost effective in terms of both time and money, compared with an RCT, for example(49).

The disadvantages of register-based research are the relatively short follow-up (septoplasty register), data are not collected by the researcher and may therefore not be a perfect fit for the study, no control group is available, no objective measurements are easily available, patients do not answer during follow-up, not all procedures are reported and some hospitals do not report to the register.

The non-responders in registers often constitute a large group and we are unable to say for sure how they affect the final result, but they probably make it less accurate. The reasons why people do or do not respond are speculative and probably multifactorial(50). It has been found that socioeconomic status and educational level play a role, as well as the length and readability of the questionnaires(51, 52). In Paper II, we excluded > 4,000 patients for not

answering the questionnaire after 12 months, because we wanted to compare pre- and postoperative results. Since we had information from at least one questionnaire on this group, we were able to see that the group did not differ much from the study population (age, gender, nasal obstruction etc). Statistical methods like *imputation* can also be used to fill the gap in missing data(53). The method is described in “Statistics”.

1.5 SELECTING PATIENTS FOR SEPTOPLASTY

At *Sahlgrenska University Hospital*, the patients are usually referred from primary care with a history of nasal obstruction. At the clinic, the patient is met by the ENT surgeon, a medical history is taken and the nose is examined using anterior rhinoscopy and with an endoscope before and after decongestion. Most often, the patient is referred for a rhinomanometry, to obtain a total assessment of their nasal issues. The surgeon then makes the decision to either continue with a septoplasty or, if the problem is more of a mucosal type, other alternatives are discussed (saline nasal irrigation, intranasal corticosteroids, radiofrequency treatment etc). *The septoplasty decision is based on medical history and the clinical status of the nose, together with rhinomanometric findings*.

Objective measurements are often used in the selection of patients for septoplasty and to assess the efficacy of the procedure. In a review by Moore and Eccles, seven studies examined the relationship between rhinomanometric (RM) findings pre- and postoperatively(54). All the included patients had a pathological RM preoperatively on the obstructed side and they all reported a statistically significant improvement on RM postoperatively. The follow-up period varied from three months to ten years. The same review also studied the results of acoustic rhinometry (AR) and peak nasal inspiratory flow (PNIF). For AR, including six studies, the results showed an improvement in nasal patency postoperatively. The one study included in the review using PNIF involved 22 patients and an increase in flow (L/min) and improved nasal patency after septoplasty were seen. Another review by Holmström reports that, in many studies, there is a good correlation between pathological nasal airway resistance (NAR) on RM preoperatively and a better outcome after septoplasty. Their conclusion was therefore to operate when there is good correlation between the patient's status, history and the results of RM and, if one objective method is to be used, it should be RM(55). Van Egmond et al. conducted a systematic review published in *Rhinology* 2018 evaluating the current evidence for the effectiveness of septoplasty, in terms of both subjective and objective outcome measurements(21). Most of the included studies showed that septoplasty had a good effect on both the subjective and objective outcome, but no additional effect of turbinoplasty was found. None of the studies mentioned compared surgery with the non-surgical management of nasal obstruction.

There are studies that have *randomised* patients with NAR and septal deviations into groups of having surgery and not having surgery. Srinivasan et al. recently showed that septoplasty had a better effect on nasal obstruction after six months compared with patients left without surgery(56). This result related to both objective (PNIF) and subjective measurements (VAS, NOSE, SNOT-22). Van Egmond et al. conducted a large-scale multicentre RCT published in *The Lancet* 2019, showing that septoplasty is more effective than the non-surgical management of nasal obstruction in adults with a deviated septum(41). The RCT included 203 patients stratified by age, gender and the severity of septal deviation (mild, moderate, severe) and they were randomised to either surgical or non-surgical management. The non-surgical management was either watchful waiting or medical treatment (usually local corticosteroids). The follow-up period was 24 months. The primary outcome was health-related quality of life after 12 months, using the Glasgow Health Status Inventory (GHSI). Secondary outcomes were the objective assessment of nasal patency, including RM and PNIF. Health-related quality of life was measured using NOSE, SNOT-22, EQ-5D-3L and GBI. Both RM and PNIF showed results in favour of septoplasty, although overall RM differences were fairly small and less consistent than the results from PNIF. NOSE and SNOT-22 also showed large effects in favour of the septoplasty group. Another large multicentre RCT is currently ongoing, comparing septoplasty with medical therapy(57).

There is also the option to *wait and see* instead, if surgery is in doubt. There are studies supporting this strategy, showing a spontaneous improvement in many patients. In a study by Sipilä, patients had been on the waiting list for septoplasty for four to five years and many of them turned out to be happy with their nasal breathing and not in need of surgery when it was finally offered(58). These results have previously been supported by Jessen et al., when they followed up patients with nasal obstruction and a septal deviation, with a normal NAR and not undergoing septoplasty(59). A large number of them had no nasal complaints at follow-up after a few years. Moreover, Thulesius et al. found that, for 36% of their patients left without surgery, nasal stuffiness was reduced or had disappeared seven to nine years after their first pathological RM(60). With higher age, the probability of belonging to the improved group increased. It is only possible to speculate about why there is a correlation between increased age and reduced NAR in this study, but studies show that higher age is associated with larger nasal cavities(61). Higher age at surgery was also seen as a predictor of a better outcome in one of our own studies(44).

The combination of *objective and subjective* methods is often used in studies of septoplasty. When it comes to the use of CT scans in the septoplasty decision, the issue is widely discussed. In their paper from 2019, Janovic et al. studied the use of the CT-imaged grading of nasal septum deviation and whether it should be used in the decision-making relating to surgery in a group of 225 patients(62). The CT morphology of the septum was analysed, the angle of the septal deviation was measured and the nasal obstruction was assessed using the NOSE questionnaire. The authors then looked at the relationship between these three parameters. The conclusion was that CT is not recommended as an objective diagnostic tool in the decision-making relating to septoplasty and that NOSE provides more valuable information on the quantification of nasal obstruction severity.

Among the numerous *subjective methods* that can be used, Corredor-Rojas et al. analysed the correlation between different subjective scales, including the VAS, NOSE and GBI after septoplasty + turbinoplasty(63). They included 56 patients (21 female) and 75% of the patients had a VAS score of < 6 and a NOSE score of < 50 after surgery. Moreover, 75% of the patients experienced enhanced quality of life according to the GBI. This research found a strong correlation between the NOSE and VAS, suggesting that the two scales can be used interchangeably.

The NOSE and **VAS** are two of the most used PROMs in septoplasty. Rhee et al. conducted a review, attempting to find *normative values* for these two scales(64). For patients with no history of NAO, the average NOSE score was 15 on a scale from 0-100, while the average VAS score was 2.1 on a scale from 0-10. The scores for patients who sought corrective surgery for NAO were 65 and 6.7 respectively. For the general population, the scores came in between and were 42 and 4.6. A clinically meaningful measurement of surgical success can be regarded as a change of > 30 for the NOSE and > 3 for the VAS.

Suggested limits when using the NOSE and VAS to grade NAO

Degree of NAO	**NOSE** (0-100)	**VAS** (0-10)
Mild	15-25	<3
Moderate	25-50	3-6
Severe	>50	>6

2 AIMS

The overall aim of this thesis is to find predictors of a better outcome from septoplasty and to strengthen the decision-making basis for the surgeon before deciding upon surgery. Further, to investigate gender differences in patients undergoing septoplasty.

Paper I

To use data from the SNSR during a 10-year period, in an attempt to find predictors of better subjective symptom relief in patients six months postoperatively

Paper II

With data from the SNSR, to analyse and compare data from PROMs pre- and postoperatively, including subjective symptom relief twelve months postoperatively, looking for predictors of a better outcome

Paper III

To evaluate outcome after septoplasty in a group of patients all diagnosed, operated on and followed up by one experienced senior surgeon at the same clinic

Paper IV

To analyse gender differences in a large group of patients from the SNSR and investigate whether men and women undergoing septoplasty differ in the pre- and postoperative PROMs

3 PATIENTS AND METHODS

3.1 STUDY DESIGN AND SUBJECTS

Paper I

This is a retrospective register study, including 5,865 patients, all > 18 years of age and registered in the SNSR between 2003-2012. The patients had undergone a septoplasty or a septoplasty + turbinoplasty with the indication of nasal obstruction. Patients aged < 18 years, all undergoing septoplasty as an emergency procedure following nasal trauma, or other acute conditions, were excluded. This was defined as having surgery within two weeks or less from the decision to perform surgery to the actual septoplasty. Further, patients undergoing revision septoplasty were excluded, together with patients undergoing septoplasty in combination with other surgical procedures (for example, FESS). Patients with incomplete questionnaires were excluded. In the primary analyses, we wanted a match between PAR and SNSR of > 70%.

Patient-rated symptom relief six months postoperatively was analysed in relation to age, gender, type of surgery (septoplasty or septoplasty + turbinoplasty), size of hospital or surgical centre where surgery was performed and whether the patient made any unplanned visits to the hospital within two weeks after surgery (due to nasal pain, infection or bleeding). The hospitals were divided into the following categories: “university”, “county” and “district” hospitals. In Sweden, a minority of surgical centres are within private healthcare and these were categorised as “others”.

Paper II

This is a retrospective register study including 888 patients registered in the SNSR during a two-year period, 2015 and 2016. The inclusion criteria were age > 18 years, no acute surgery, answers to both pre- and postoperative questionnaires (12 months) and, finally, patients with “no nasal obstruction” preoperatively were excluded (see figure below).

Patients who rated their nasal obstruction as one level better twelve months after septoplasty compared with their preoperative rating were defined as “improved”.

The data from the SNSR were compared with the number of septoplasties registered in the NPR by personal identity numbers. The match, or coverage of data, was 49% in 2015 and 48% in 2016. This meant that about half of all septoplasties performed in Sweden during these two years were reported to the SNSR.

Paper III

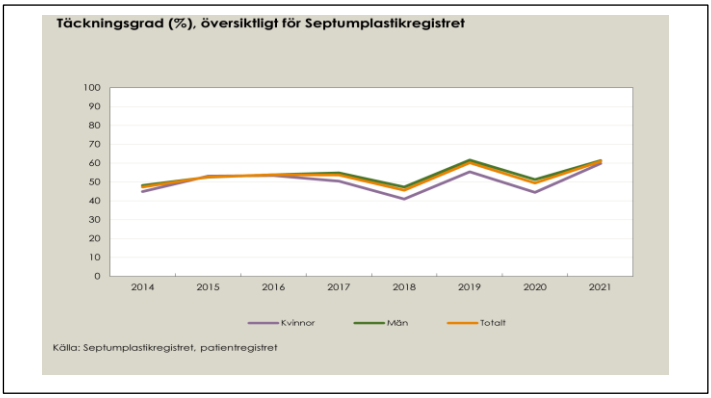
A retrospective cohort study including 366 patients referred for nasal obstruction to a small private clinic outside Oslo, Norway. The patients underwent septoplasty, septoplasty + turbinectomy or turbinectomy alone. All the patients met the same experienced ENT surgeon preoperatively, at surgery and finally at the follow-up after three to six months. The patients completed a questionnaire including questions on age, gender, allergy, asthma and smoking habits. They also filled out the VAS for twelve sino-nasal symptoms (Nose-VAS). The same Nose-VAS was filled out at the postoperative follow-up.

Nose-VAS: Putting a mark on a 100 mm linear scale ranging from no symptoms to worst possible symptoms. The symptoms included nasal obstruction, nasal discharge, oral breathing, snoring, sleep apnea, headache, midface pain, coughing, sneezing, sense of smell, sinusitis and finally general health.

Paper IV

A retrospective register study including 2,532 patients from the SNSR undergoing septoplasty or septoplasty + turbinectomy on the indication of nasal obstruction in 2014-2019. Preoperative variables and postoperative outcome after twelve months were compared between genders. Patients with no nasal obstruction preoperatively were excluded, together with patients not answering both the pre- and postoperative questionnaires after 12 months.

The number of patients from the SNSR was compared with the number of septoplasties reported to the NPR (all septoplasties performed in Sweden) during the same period. The coverage can be seen in the figure from the SNSR below (*2014: 42%, 2015: 49%, 2016: 48%, 2017: 47%, 2018: 45% 2019: 60%*).



3.2 STATISTICS

The statistical analyses were performed by professional statisticians, in collaboration with the authors. A p-value of < 0.05 was considered statistically significant.

Paper I: Percentages or mean values and range were used to present the descriptive statistics. A box plot illustrates patient age in relation to patient-rated symptom relief six months after surgery. Multivariable logistic regression was used to analyse the relationship between the different predictors and patient-rated outcome after six months. This was presented as the odds ratios (OR) with 95% confidence intervals (CI).

Paper II: Descriptive statistics are presented as percentages or mean values with standard deviations (SD). Logistic regression was used to calculate odds ratios. Multiple imputation was used due to the large amount of missing data for the question regarding "unplanned visits to healthcare within one month of surgery".

Paper III: Continuous data are presented as the mean +/- SD and the categorical variables are presented as percentages. Fisher's exact test and Fisher's permutation test were used when comparing the three groups of different surgical methods. To study the change after surgery, we used Fisher's test for pairwise comparison.

Paper IV: To summarise the characteristics of the study population, descriptive statistics were used. Means and SD were used for continuous variables, while percentages were used for categorical variables. Odds ratios were calculated using ordinal logistic regression and comparisons between groups were made using Pearson's chi-square test.

Basic statistics used in Paper I-IV

Mean and standard deviation

The mean is the average of all numbers (the sum of numbers divided by the total count of items included). It is most appropriate with normally distributed data. The mean is typically presented with a **standard deviation (SD)**, which indicates the average spread of numbers around the mean value(65). The mean and SD are used in most of the descriptive data presented in the papers. **The median** is the middle number of all numerical values. It is not as sensitive to outliers as mean values and may be a better choice when the distribution is skewed(65). The interquartile range is usually used as a dispersion measurement with the median.

Odds ratio

The odds ratio (OR) is a measurement of association between an exposure and an outcome. The OR represents the odds that an outcome will occur given a particular exposure, compared with the odds of the outcome occurring in the absence of that exposure(66).

OR=1	Exposure does not affect the odds of outcome
OR>1	Exposure associated with a higher odds of outcome
OR<1	Exposure associated with a lower odds of outcome

Confidence interval

Presenting a confidence interval (CI) provides information on the uncertainty of the measured value. In epidemiological research, a 95% CI is most often used. Loosely speaking, one could say that we are 0.95 “confident” that the unknown value is in the interval. A wide CI means more uncertainty, while a narrow CI means more precision in relation to where the true value might be(67).

For example, in Paper I (Table 3), odds ratio estimates are presented with a 95% CI for predictors in relation to outcome. For “Unplanned visits no vs yes”, the OR estimate is 1.61 with a CI of 1.39-1.85, which tells us it is likely that there is a better outcome if no unplanned visits were made postoperatively, since all the values of the CI lie above 1. For “Septoplasty without turbinoplasty vs with turbinoplasty”, the OR estimate is 0.97, with a

CI of 0.87-1.08. Since the values of the CI lie both below and above 1, the outcome could be either better or worse for a septoplasty without turbinoplasty compared with a septoplasty with turbinoplasty.

Statistical significance

The **p-value** is the probability of obtaining an effect equal to or more extreme than the one observed, considering that the null hypothesis is true. The significance level decides when we can reject the null hypothesis(68). In epidemiological research, the **significance level** is usually set at 5% (0.05), which is believed to be a reasonable level of risk at which we can reject the null hypothesis.

A type I error – is the risk of concluding that there is a difference when there is none (we reject a true null hypothesis).

A type II error – is the risk of not concluding that there is a difference when there is one (we accept a false null hypothesis).

If we lower our significance level to try to avoid type I errors, the risk of type II errors increases and vice versa. Increasing the **power** of the study can be performed by increasing the study sample, to improve our chances of detecting a difference between treatments without changing the level of significance.

A common error is to regard the p-value as the probability that the null hypothesis is true, which is not the case(68).

Types of data

Statistical data can be divided into **categorical** (0 or 1), **ordinal** (0, 1, 2, 3, 4 etc) or **numerical** (*discrete* or *continuous*). Categorical together with ordinal variables are also called **qualitative** variables. Numerical variables are called **quantitative** variables, where the data represent amounts, such as height, age, or weight, for example.

Presenting data

A **boxplot** shows the distribution of data in an illustrative way. The middle bar represents the median, while the edges of the box represent the first and third quartiles. The lines usually represent the data extending to 1.5 times the interquartile range(65). As used in Paper I (Figure 2), describing patient age in relation to patient-rated relief of symptoms six months postoperatively.

Regression analysis

Regression analysis is a type of modelling technique that is used to find a relationship between a dependent variable and either one or several independent variables. When two or more independent variables are used to predict the outcome of the dependent variable, it is called *multiple regression*. Two of the most used types of regression analysis are *linear regression* and *logistic regression*.

Binary logistic regression

This is a multivariable regression model relating one or more predictor variables to the probabilities of various outcomes(67). Binary logistic regression is the most used to predict a binary outcome (only two possible scenarios) based on a set of independent variables.

Ordinal logistic regression

This is a type of logistic regression which is used when the response variable is ordinal with more than two possible values(69). While there are several different ordinal logistic regression models, the most used is the proportional-odds cumulative logit model, often referred to as the proportional odds model, the ordered logit model or simply as *ordinal logistic regression*. We used this method in Paper I, where we modelled the odds of having the same or a better reported outcome.

Missing data

Several statistical methods are available for handling missing data and imputation is one of them. In Paper II, we used **multiple imputation**, where missing data values are imputed based on the distribution of other variables in the dataset. This is a method that is able to handle different types of missing data and it has become widely recognised as a reliable method(70). The reason why the imputation is performed multiple times is to avoid the variation in the dataset being too large or too small. This could affect the p-values and the CI.

The exclusion of incomplete data sets is also an option for handling missing data.

3.3 ETHICAL CONSIDERATIONS

The studies were conducted in accordance with the Declaration of Helsinki. Data were handled according to Swedish law and regulations. Studies I, II and IV were approved by the Regional Ethical Review Board in Gothenburg, Sweden. Study III was approved by National Ethics Committee of Norway. The patients were informed about the register by the ENT surgeon when planning the septoplasty. Returning the questionnaires was regarded as informed consent.

Paper I: Reference number (Dnr) 074-15

Paper II: Reference number (Dnr) 092-18

Paper III: Reference number 134609

Paper IV: Reference number (Dnr) 2021-01559

4 RESULTS

4.1 PAPER I

The study comprised 5,865 patients and 76% of them were men. Over 80% of all patients underwent surgery at large hospitals, such as county or university hospitals. Patients undergoing surgery at university hospitals were slightly less satisfied than the ones undergoing surgery at a county or district hospital.

Overall, 76% of the patients reported that their symptoms had "almost gone" or "gone" six months after surgery. A higher mean age predicted a better outcome. Unplanned visits within two weeks after surgery due to nasal bleeding, infection, or pain were almost twice as common in patients reporting "symptoms remain" after six months as they were for the others. The odds ratios for factors predicting the patient-rated outcome postoperatively show that unplanned visits to healthcare within two weeks of surgery was the strongest predictor of a less good outcome.

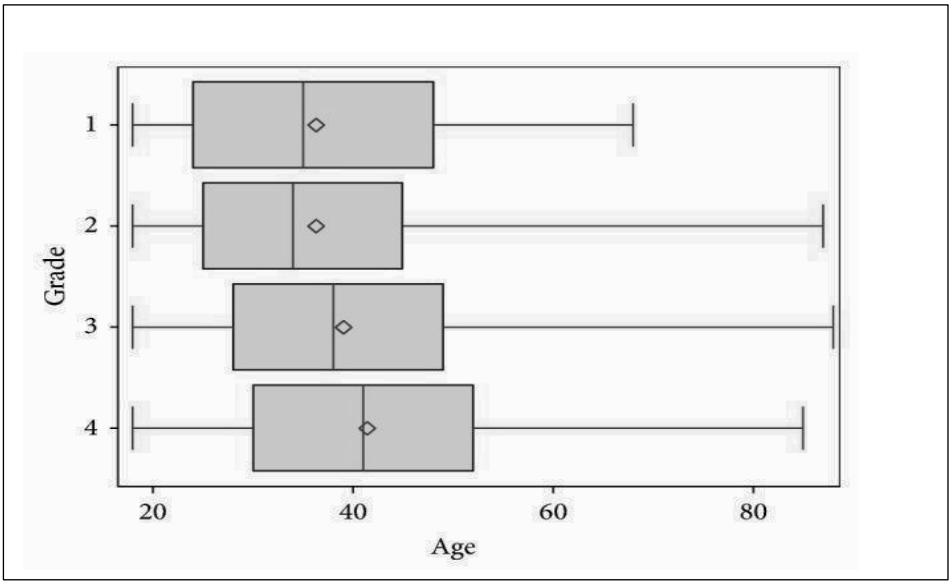


Figure: *Patient age in relation to grade of patient-rated symptom relief six months postoperatively. 1=my symptoms have worsened (n=167), 2=my symptoms remain (n=1,254), 3=my symptoms have almost gone (n=2,753), and 4=my symptoms have gone (n=1,691). N=5,865.*

4.2 PAPER II

A predominance of men (71%) was seen in the material comprising a total of 888 patients. An improvement in nasal obstruction was defined as one level of change in the questionnaire, going, for example, from "severe" preoperatively to "moderate" postoperatively. With these criteria, 63% of the study population experienced an improvement in their nasal obstruction postoperatively. An improvement was experienced by 81% of the patients with a severe nasal obstruction, while 31% of the patients with a mild nasal obstruction improved. Activity limitation and impaired sleep were strongly related to the level of nasal obstruction.

In the regression model adjusted for age, gender, nasal obstruction preoperatively, time of day/night of symptoms, activity limitation preoperatively, the presence of allergic rhinitis and unplanned visits within one month of surgery, we could see that both higher age at surgery and no reported unplanned visits due to complications within 1 month after surgery were associated with an improvement in nasal obstruction 12 months postoperatively.

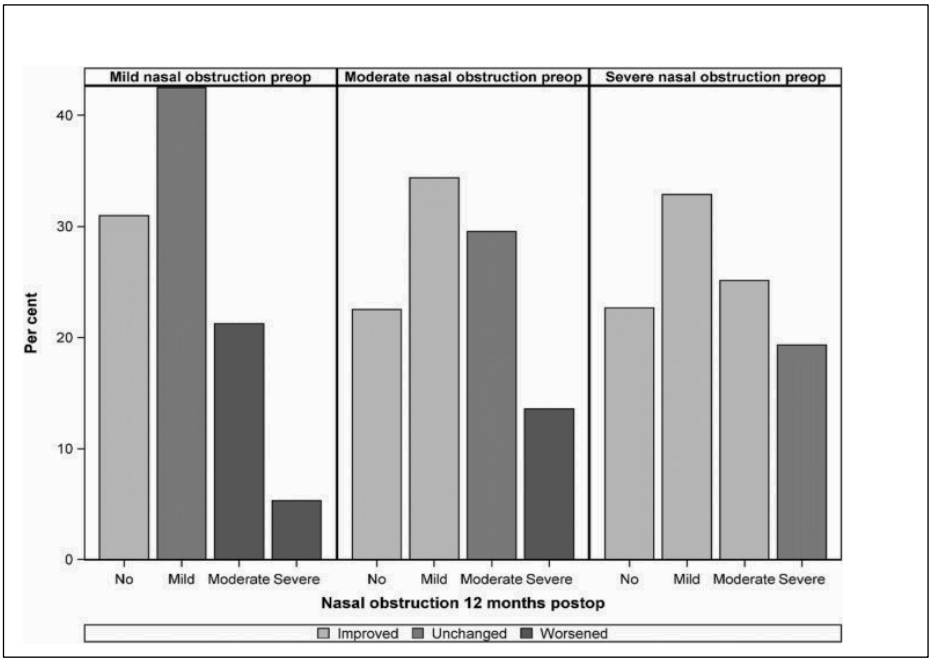


Figure: *Severity of NAO 12 months postoperatively (%) in relation to self-reported NAO preoperatively. Light-grey bars indicate less nasal obstruction postoperatively. N=888.*

4.3 PAPER III

This study comprised 366 patients with a mean age of 39.1 years. Preoperatively, the Nose-VAS was highest for nasal obstruction and mouth breathing. These two parameters also experienced the greatest improvement on the Nose-VAS at postoperative follow up. All the Nose-VAS symptoms, including nasal obstruction, improved significantly after surgery. Patients undergoing a turbinoplasty as a single procedure had more nasal obstruction postoperatively compared with the other two groups. No differences were seen between septoplasty alone and septoplasty + turbinoplasty. General health improved the most in patients undergoing septoplasty + turbinoplasty.

When dividing the patients into three groups based on their Nose-VAS score (mild, moderate, severe), we could clearly see that patients with severe nasal obstruction had the greatest chance of improvement. The patients with mild nasal obstruction experienced the least improvement.

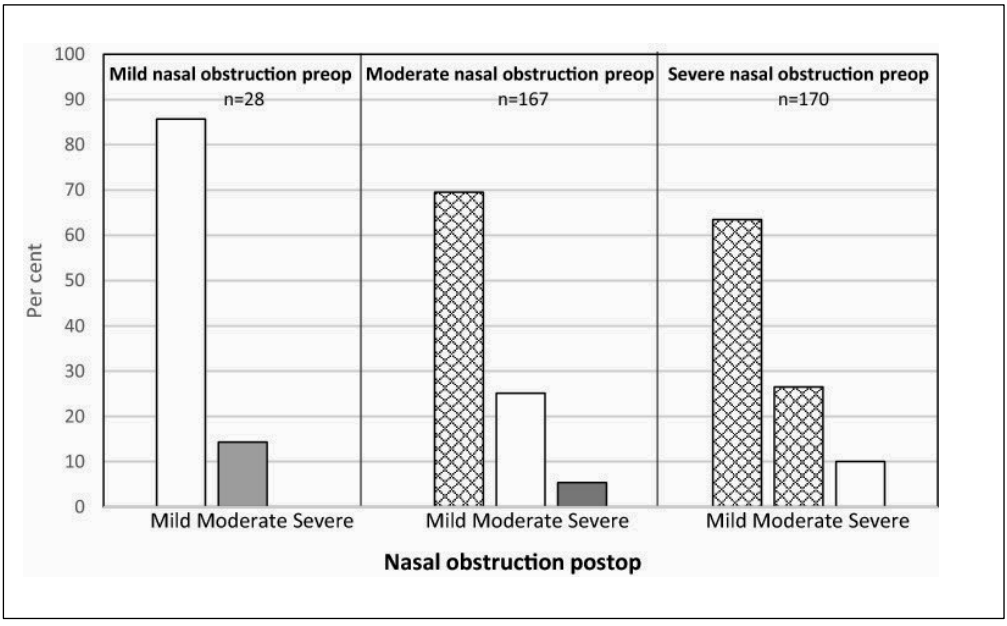


Figure: *Change in self-rated Nose-VAS for NAO postoperatively for all surgical procedures (septoplasty, septoplasty + turbinoplasty, turbinoplasty alone). Checked: improved, white: unchanged, grey: deterioration.*

4.4 PAPER IV

Of 2,532 patients included in the study, 1,829 (72%) were men. Regarding most of the parameters asked about in the preoperative questionnaire, there were no differences between men and women, including mean age, tobacco smoking, rhinitis, nasal polyps and preoperative pathological rhinomanometry. Men reported more problems with snoring and sleep apnea.

As well as a self-reported nasal obstruction preoperatively, the postoperative nasal obstruction after 12 months was similar between genders. No difference in the choice of surgical method (septoplasty or septoplasty + turbinoplasty) or overall satisfaction with the surgical result after 12 months was found between men and women.

The multivariable ordinal logistic regression of predictors shows that unplanned extra visits postoperatively were related to a poorer outcome, while an increase in age of five years predicted a better outcome.

	Female		**Male**	
Symptoms n (%)	**Preop**	**Postop**	**Preop**	**Postop**
No	**-**	168 (24)	**-**	428 (23)
Mild	85 (12)	257 (37)	235 (13)	667 (37)
Moderate	334 (48)	184 (26)	832 (45)	490 (27)
Severe	284 (40)	94 (13)	762 (42)	244 (13)

Table: *Self-reported NAO preoperatively and postoperatively for both men and women. N=2,532.*

5 DISCUSSION

The aim of this thesis was to improve our knowledge relating to predictors of outcome after septoplasty. The fact is that around 25% of all patients in our material are not satisfied with the result, but we have no good explanation for this(21). The SNSR is one of the largest databases for information on septoplasty and it therefore offered a unique opportunity for research. We started out with the first part of the register (Paper I), containing a large amount of data and the questions in the questionnaires were more general than in the updated questionnaires used in Papers II and IV. The updated questionnaires gave us the opportunity to look at more specific factors in each patient undergoing septoplasty and how they affect the outcome (Paper II). In Paper IV, we attempted to address the obvious gender difference in septoplasty, where men are overrepresented, and to discuss this from different perspectives. With three papers based on material from a wide variety of clinics and ENT surgeons from all over the country, Paper III is a contrast, as we have one senior ENT surgeon from one small clinic.

In **Paper I,** we have data on almost 6,000 patients undergoing septoplasty in different parts of Sweden during a 10-year period. Analysing the surgical outcome in this cohort reveals that higher age, patients having surgery outside university hospitals and patients making no unplanned postoperative visits due to pain, nasal bleeding or infection within two weeks of surgery were associated with a better result. The fact that age might play a role in the outcome was an interesting finding, since, to our knowledge, this has not been reported before. This finding cannot be used to set an age limit for septoplasty, but what we saw is that, for each 10-year increase in age, there is an increase of 1.2 in the odds of having a better result. This is something to bear in mind when these patients are seen at the clinic.

Searching the literature reveals studies indicating the opposite of our findings, that higher age is associated with a poorer result after septoplasty(71, 72). The extent to which **age** is able to predict the outcome of septoplasty is therefore still unclear and there are probably other factors that have a more decisive impact on postoperative satisfaction than age alone. There are studies indicating that the postoperative pain decreases with increasing age at population level(73). If older patients experience less pain postoperatively, they might be more inclined to report a better result at follow-up. However, in this area there are also studies that have found no difference in postoperative pain intensity in relation to age(74). More specifically in terms of pain after surgery in the ENT area, large differences in pain levels could be seen at different sites of surgery. However, neither gender nor age was an independent predictor of pain(75). The effect of age is a subject of debate and this could also relate to expectations based on previous life experience. For septoplasty,

as for all kinds of surgery, it is important to inform and make sure patients have realistic expectations and do not regard the surgery as a guarantee of symptom improvement. Studies in this area report that a lack of received knowledge preoperatively is associated with a higher rate of complications postoperatively(76). The same study indicates that female patients' informational needs are different and are not met as frequently as those of male patients.

The **overrepresentation of men** in our material is not unexpected, as we see this in most articles on septoplasty. This is also why we wanted to investigate gender differences in detail in Paper IV. The reason why women are outnumbered is unclear, but recurring theories are that men are more involved in accidents related to sport, motor vehicles and other activities with a risk of acquiring a deviated septum and nasal obstruction. In general, studies from primary care show that women seek more healthcare than men when it comes to both physical and mental health(77). As a result, it is somewhat surprising that women are most frequently underrepresented in septoplasty material.

One interesting theory on the overrepresentation of men is the role of *hormones* in respiratory symptoms that we discuss in **Paper IV**, indicating that women may not experience the same airway problems as men until menopause and that this could be part of the explanation of why women are outnumbered(78). For example, progesterone, which decreases after menopause, is known to increase the tone of the upper airway muscles and to stimulate respiration by increasing the chemoreceptor response to hypoxia and hypercapnia(79). With this knowledge, an age difference between men and women undergoing septoplasty would be expected, i.e. men might have a lower average age than women. In **Paper IV**, when searching for differences between genders, we found surprisingly small distinctions. Despite including 2,532 patients in our study, we found no large gaps in preoperative PROMs including age and it emerges that the group of patients undergoing septoplasty is very homogeneous, regardless of gender. On the other hand, several studies have shown that patients left without surgery for different reasons ("wait and see") experience a relief of nasal airway obstruction and are not in need of surgery when it is finally offered(58-60). It has also been reported that the nasal cavities get larger with higher age(61). This might be part of the explanation why women do not seek healthcare for nasal obstruction after menopause. These theories give no final explanation of the overrepresentation of men and this question is therefore still unanswered.

In **Paper II,** there is a longer follow-up period, 12 months instead of six, and 888 patients from the SNSR were included. At the 12-month follow-up. 63%

of the patients experienced an improvement in their symptoms Here, too, higher age was also associated with a better result postoperatively. With the new and updated questionnaires, it was interesting to see that *severe nasal obstruction* preoperatively was associated with a better outcome. Severe nasal obstruction was seen in 41% of the patients and, of these, 81% had improved 12 months after surgery. For patients with moderate nasal obstruction preoperatively, the improvement rate was 57%, while for mild nasal obstruction it fell further to 31%. We made the same finding in **Paper III**, as seen in Paper II, that the patients *with severe nasal obstruction improved the most*. For the group of patients defined as severe nasal obstruction in Paper III (VAS > 70), 90% improved to a mild or moderate nasal obstruction. These are very good results, supporting the theory of using PROMs in the selection of the patients benefiting most from septoplasty. This is something that should be accounted for when making the preoperative assessment and the recommendation should be to avoid surgery on the patients reporting only a mild NAO. This theory is supported by other authors and is seen as a common finding in the comprehensive review by Tsang et al. (58, 80, 81).

We found good agreement *between degree of nasal obstruction and impact on daily activity and sleep*, pre- and postoperatively in **Paper II**. Some 83% of the patients experienced a moderate to severe effect on daily activity and sleep preoperatively due to their nasal obstruction and postoperatively this number was down to 33%. It is possible that a negative effect on daily activity and sleep is something that affects productivity at work for this group of patients. Other studies also show a positive effect after septoplasty on general health. A study by Bugten et al. reports an improvement in *general health and snoring* from septoplasty on the VAS, together with an improvement on the SNOT-20, which includes questions on daily activity and sleep, although their patients with OSAS reported more snoring postoperatively on the VAS than patients without OSAS(82). Without going too much into OSAS, as it is not the subject of this thesis, there are indications that septoplasty and turbinate reduction improve the use of CPAP treatment in patients with nasal obstruction together with OSAS(83). The connection between the degree of nasal obstruction and the impact on daily activity and sleep is an important finding that supports septoplasty as a treatment for nasal obstruction, despite 25% of the patients not being satisfied with the result.

Van Egmond et al. made an *economic evaluation* alongside their RCT when comparing septoplasty with non-surgical management for nasal obstruction in patients with a deviated septum with a follow-up time of 24 months(84). From a healthcare perspective, septoplasty appears to be cost effective after just 24 months and, from a societal perspective, it comes closer to the cost-

effectiveness threshold as time passes, but is not quite there after 24 months. Much of this is due to the surgical costs in the first year. The cost difference between surgical and non-surgical treatment was found to decrease over time, but the difference in health-related QOL between the two groups persisted, with the septoplasty group having a better QOL. Predicting the cost and cost effectiveness of different diseases and treatments is complicated, but previous studies have also shown high societal costs for nasal issues like allergic rhinitis(85). Another large ongoing multicentre study (RCT) including patients from Scotland, England and Wales is also looking at the economic aspects of nasal obstruction and septoplasty(57).

In both **Papers I and II,** we found that *unplanned visits to healthcare* within one month after surgery due to pain, infection, bleeding, or other causes was associated with less improvement. Pain was the most common reason for unplanned visits. All these factors and the fact that the patients had to make an extra unplanned visit to healthcare may affect the patients' perception of otherwise successful surgery and they focus on the problems and remaining symptoms. Bearing this in mind as a surgeon, attempting to optimise pre-, per- and postoperative care should therefore be a priority in septoplasty. This can be achieved by following strict hygiene routines in preparation for and during surgery, by all personnel. During surgery, it is important to try to be as atraumatic as possible and keep the mucosa intact. Postoperatively, the patient should be informed about rinsing the portex tubes (if used) regularly, to avoid dirty environments and keep away from possible infections. It is also important to have a plan for postoperative pain management and ensuring that the patients have realistic expectations of the results.

In **Paper III,** we have unique material, where only *one ENT surgeon* managed the patients from the preoperative visit, to surgery, to the follow-up after three to six months. This contrasts to the material from the SNSR in Papers I, II and IV. The overall result after septoplasty was very good in this paper, when comparing the Nose-VAS pre- and postoperatively, with a mean relief of nasal obstruction of 36.8 (0-100). This corresponds to a 57% improvement, which gives a postoperative mean VAS for nasal obstruction of 30. According to some definitions of the VAS for normal nasal breathing, the score is around 20(64). It might be thought that one experienced surgeon at a small clinic would have superior results compared with the wide variety of surgeons around the country in hospitals of different kinds (SNSR). Although it is not easy to compare the results between studies when using different PROMs, it can be seen that they are not that different, even though they appear to be slightly better in Paper III. It is also possible to speculate about the fact that, when a patient meets the same ENT surgeon postoperatively who asks about the result

of the surgery, that patient might be more prone to report a higher degree of satisfaction than if they met someone they had never seen before (which is most often the case at our clinic). A study from Aberdeen by Karlsson et al. compared surgeons from different levels, from junior trainee to consultant, to see if the revision rate after septoplasty differed(86). They found that this was of no statistical significance for the need for revision surgery. Even though the level of the surgeons may differ between countries and cannot be compared straight off, this says something about the importance of this factor in septoplasty.

In **Papers I, II** and **III,** we were unable to find any additional effect on the result from adding turbinate surgery to the septoplasty. In **Paper III,** patients experienced a greater effect on general health with a combination of the two but no effect on the question of nasal obstruction. In the same paper, no effect on general health by turbinoplasty alone was found. Frequent candidates for isolated turbinate surgery are often patients with mucosal disease who do not respond to nasal corticosteroids. The primary problem for the group of patients included in this thesis is a structural problem causing their NAO. This might explain why the effect of adding turbinate surgery is not a permanent sensation of improved nasal breathing, even though more space is created inside the nose by removing a part of the turbinate. So, the results are conflicting when it comes to the effect on general health and this cannot easily be explained. Moreover, other large studies have failed to find an additional effect of turbinoplasty in combination with septoplasty(41).

There are studies indicating that a septal deviation affects nasal breathing in more ways than just as a result of the structural obstruction. This includes inducing **histopathological changes** in the nasal mucosa, causing a chronic inflammation in the mucosa on the opposite side of the deviation(87). It is possible to suggest that this inflammatory process may be brought about in the more open nasal cavity as a result of increased airflow and that a nasal obstruction also on this side could be generated during this process(88).

The **trigeminal function**, the role it plays in nasal breathing and the sensation of a blocked nose is an interesting topic. Since we know that numerous people in the population (up to 80%) have a deviated nasal septum to some degree, it is reasonable to suppose that something beyond the structural obstruction causes the symptoms. Malik et al. suggest that an impaired ability to lateralise menthol and the cooling sensation rather than a change in airflow in the presence of a deviated septum could drive the symptoms of obstruction(89). The same author also published material on empty nose syndrome (ENS) in 2019, where it could be seen that patients with ENS had an impaired trigeminal

function compared with healthy controls and compared with other patients who had undergone a turbinate reduction but did not have ENS(90). In the same study, the patients were also examined with CFD, which revealed different flow patterns of air when comparing ENS patients with patients who had undergone an inferior turbinate reduction (but no ENS). This is interesting and could perhaps be something that could be part of future diagnostics when planning septoplasty and especially when combining it with turbinate reduction.

The use of different **PROMs** is an area of debate and it is often claimed that one PROM is better than another. In general, PROMs are good tools and should be used in septoplasty decision-making. As discussed earlier in this thesis, there is no PROM that is superior to all the others, but all of them have their pros and cons. The more detailed PROMs give more information, but they are also more time consuming and may provide irrelevant information. The *Nose-VAS* is easy to use and is not particularly time consuming. The same can be said of the *NOSE*, which gives more information than the VAS and is often used in published material on septoplasty. In a review by Tsang et al., the NOSE questionnaire is discussed as a promising validated system(81). Using the data from Rhee et al. on normative values, together with Corredor-Rojas et al.'s evaluation of subjective scales, one suggestion would be to avoid surgery on patients with a NOSE score of < 25 and a score of < 3 for the VAS(63, 64).

As stated by C Hopkins in her *Rhinology* article discussing PROMs back in 2009: *"PROMs are here to stay – we can ignore them at our peril or we can embrace them and use them to our advantage"* (91).

6 CONCLUSION

Septoplasty with or without turbinoplasty is a good treatment for relieving the symptoms of NAO. Three out of four patients in our material experience an improvement.

Use PROMs to indicate the degree of nasal obstruction. Avoid surgery on patients with only mild symptoms: NOSE score < 25 or VAS < 3.

Unplanned postoperative visits due to bleeding, infection, or pain within the first weeks of surgery have a strong association with a poorer outcome. Good routines to avoid this should be a priority in septoplasty.

Men are overrepresented in most material on septoplasty and, despite different theories, we have no good explanation of why this is the case.

No gender differences have been found in preoperative PROMs in the group of patients undergoing septoplasty in Sweden. Nor do the postoperative results differ between men and women.

7 FUTURE PERSPECTIVES

It is to be hoped that we shall be able to agree on a more standardised management of septoplasty patients in Sweden in the future. From the selection of patients and the use of subjective and objective methods to the type of surgery and postoperative care. Today, we have good support relating to the effect of the procedure on NAO compared with medical treatment, together with a positive health-economic perspective. If, in Sweden, we could reach consensus on the management of these patients, it would be beneficial to all parties.

Taking advantage of the knowledge from this thesis and available research today, agreeing to use PROMs (for example, the NOSE or VAS) and rhinomanometry, together with the status and medical record of the patient, would be a good start. Together, these tools give us an excellent foundation for making the best decision.

It is also important to inform patients about the surgery, so that they have realistic expectations of the postoperative period and the result. Optimising the routines pre-, per- and postoperatively, to avoid both early and late complications, can help improve the results after septoplasty.

8 STRENGTHS AND LIMITATIONS

A *large amount of data* is available and it is relatively easy to access in the registers. Collecting material of this size, including hundreds or thousands of patients, would be very time consuming and costly.

We have unique material from the SNSR; from small hospitals, university hospitals and private clinics with surgeons at different levels. In this way, the data reflect *"everyday life" at the clinic*.

In Paper III, we also have *unique material* as only one surgeon at one clinic took care of the patients from preop to postop. This contrasts to the material from the SNSR.

Register data are limited, as the material is not collected for a specific research question. Sometimes, it would be useful to add some further information.

We have a *possible selection bias*, as it is not a mandatory register and not all septoplasties performed in Sweden are reported. On the other hand, we have no reason to believe that the "missing data" would look very different, since our results are very much comparable to other data published on the subject.

The lack of *objective measurements* is a limitation. We have the information on whether the patients have made objective measurements and whether or not they are pathological, but in order to study the results in greater detail, we would have to search every patient's medical record.

The *follow-up period* is up to 12 months in this thesis and we do not know what happens to the patients after that. It would of course be interesting to see what happens after five or 10 years, but as discussed in this thesis, other studies have looked at that.

ACKNOWLEDGEMENTS

First of all, I would like to thank my main supervisor, **Johan Hellgren**, for your patience and support throughout this journey. It started out with a small local quality project at the ENT clinic at Sahlgrenska University Hospital and ended up in this thesis some years later. Your enthusiasm and knowledge of research is inspiring.

My assistant supervisors: **Kenneth Holmberg**, **Cecilia Ahlström-Emanuelsson** and **Sverre Steinsvåg** for your engagement, comments and help on the way

Assistant supervisor and statistician, **Linus Schiöler**, for your comments, advice and professional help with the statistics

Helena Johansson, statistician, for your help on Paper II

Many thanks to all the co-authors for sharing your expertise and constructive advice on Paper II; **Sarmed Finjan**, **Åke Davidsson** and **Ola Sunnergren**

Thanks to **Sverre Dölvik** for letting us use your unique material and your contribution to Paper III

Previous and present heads of the ENT clinic at Sahlgrenska during my time at the clinic; **Hasse Ejnell**, **Kaarina Sundelin**, **Radi Jönsson** and **Erik Renvall,** for creating a good research environment and making it possible to combine research with the clinical work

I would like to thank all my *former and present colleagues* for your support during this time and work. Thanks for your advice, comments, discussions and critical judgement along the way

Björn Petruson, for letting me use your book *Med kniven i näsan* as inspiration and for allowing me to use your great illustrations

Last but not least, thanks to my parents, *Bjørg* and *Asbjørn Pedersen*, for love and support throughout my life and for believing in me. My wife *Cecilia*, for your love and support. And thanks to our three wonderful children, *Filip, Juni* and *Ines,* for reminding me what is important in life. I'm grateful to have you all in my life, I love you!

References

1. Haffey T, Pabon S, Hawley K, Hoschar A, Sindwani R. Exploring the clinical value and implications of routine pathological examination of septoplasty specimens. Laryngoscope. 2012;122(11):2373-7.
2. Fettman N, Sanford T, Sindwani R. Surgical management of the deviated septum: techniques in septoplasty. Otolaryngol Clin North Am. 2009;42(2):241-52, viii.
3. Devaiah AK, Keojampa BK. Surgery of the Nasal Septum. In: Stucker FJ, de Souza C, Kenyon GS, Lian TS, Draf W, Schick B, editors. Rhinology and Facial Plastic Surgery. Berlin, Heidelberg: Springer Berlin Heidelberg; 2009. p. 181-5.
4. Adams W. On the Treatment of Broken-Nose by Forcible Straightening and Mechanical Retentive Apparatus. Br Med J. 1875;2(770):421-2.
5. Peacock MR. Sub-mucous resection of the nasal septum. J Laryngol Otol. 1981;95(4):341-56.
6. Asch MJ. Treatment of nasal stenosis due to deflective septa, with or without thickening of convex side. The Laryngoscope.6.
7. Flint PW, Haughey BH, Robbins KT, Lund VJ, Thomas JR, Niparko JK, et al. Cummings Otolaryngology - Head and Neck Surgery E-Book: Head and Neck Surgery, 3-Volume Set: Elsevier Health Sciences; 2010.
8. Watters C, Brar S, Yapa S. Septoplasty. StatPearls. Treasure Island (FL): StatPearls Publishing

9. MacArthur FJD, McGarry GW. The arterial supply of the nasal cavity. Eur Arch Otorhinolaryngol. 2017;274(2):809-15.
10. Russell W.H. Kridel PEK, Allison MacGregor Holzapfel. The Nasal Septum [Available from: https://entokey.com/the-nasal-septum/#.
11. Champagne C, Ballivet de Régloix S, Genestier L, Crambert A, Maurin O, Pons Y. Endoscopic vs. conventional septoplasty: A review of the literature. Eur Ann Otorhinolaryngol Head Neck Dis. 2016;133(1):43-6.
12. Doomra S, Singh M, Singh B, Kaushal A. Evaluating surgical outcomes of conventional versus endoscopic septoplasty using subjective and objective methods. Niger J Clin Pract. 2019;22(10):1372-7.
13. Petruson B. Med kniven i näsan - Praktisk handledning i basal näskirurgi1996.
14. Shah J, Roxbury CR, Sindwani R. Techniques in Septoplasty: Traditional Versus Endoscopic Approaches. Otolaryngol Clin North Am. 2018;51(5):909-17.
15. Coste A, Dessi P, Serrano E. Empty nose syndrome. Eur Ann Otorhinolaryngol Head Neck Dis. 2012;129(2):93-7.

16. Buyuklu F, Cakmak O, Hizal E, Dönmez F. Outfracture of the Inferior Turbinate: A Computed Tomography Study. Plast Reconstr Surg. 2009;123.
17. Hol MK, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. Rhinology. 2000;38(4):157-66.
18. Abdullah B, Singh S. Surgical Interventions for Inferior Turbinate Hypertrophy: A Comprehensive Review of Current Techniques and Technologies. Int J Environ Res Public Health. 2021;18:3441.
19. Hamerschmidt R, Hamerschmidt R, Moreira AT, Tenório SB, Timi JR. Comparison of turbinoplasty surgery efficacy in patients with and without allergic rhinitis. Braz J Otorhinolaryngol. 2016;82(2):131-9.
20. Dąbrowska-Bień J, Skarżyński PH, Gwizdalska I, Łazęcka K, Skarżyński H. Complications in septoplasty based on a large group of 5639 patients. Eur Arch Otorhinolaryngol. 2018;275(7):1789-94.
21. van Egmond M, Rovers MM, Tillema AHJ, van Neerbeek N. Septoplasty for nasal obstruction due to a deviated nasal septum in adults: a systematic review. Rhinology. 2018;56(3):195-208.
22. Bloom JD, Kaplan SE, Bleier BS, Goldstein SA. Septoplasty complications: avoidance and management. Otolaryngol Clin North Am. 2009;42(3):463-81.
23. Ketcham AS, Han JK. Complications and management of septoplasty. Otolaryngol Clin North Am. 2010;43(4):897-904.
24. Scadding G, Hellings P, Alobid I, Bachert C, Fokkens W, van Wijk RG, et al. Diagnostic tools in Rhinology EAACI position paper. Clin Transl Allergy. 2011;1(1):2.
25. Thulesius H. Rhinomanometry in clinical use. A tool in the septoplasty decision making process. 2012.
26. Holmström M, Scadding GK, Lund VJ, Darby YC. Assessment of nasal obstruction. A comparison between rhinomanometry and nasal inspiratory peak flow. Rhinology. 1990;28(3):191-6.
27. Ottaviano G, Lund VJ, Nardello E, Scarpa B, Frasson G, Staffieri A, et al. Comparison between unilateral PNIF and rhinomanometry in healthy and obstructed noses. Rhinology. 2014;52(1):25-30.
28. Mohan S, Fuller JC, Ford SF, Lindsay RW. Diagnostic and Therapeutic Management of Nasal Airway Obstruction: Advances in Diagnosis and Treatment. JAMA Facial Plast Surg. 2018;20(5):409-18.
29. Kimbell JS, Garcia GJ, Frank DO, Cannon DE, Pawar SS, Rhee JS. Computed nasal resistance compared with patient-reported symptoms in surgically treated nasal airway passages: a preliminary report. Am J Rhinol Allergy. 2012;26(3):e94-8.
30. Sullivan CD, Garcia GJ, Frank-Ito DO, Kimbell JS, Rhee JS. Perception of better nasal patency correlates with increased mucosal cooling after surgery for nasal obstruction. Otolaryngol Head Neck Surg. 2014;150(1):139-47.

31. SNOT 22 [Available from: SNOT22.pdf (canvasc.ca).
32. Sahlstrand-Johnson P, Ohlsson B, Von Buchwald C, Jannert M, Ahlner-Elmqvist M. A multi-centre study on quality of life and absenteeism in patients with CRS referred for endoscopic surgery. Rhinology. 2011;49(4):420-8.
33. Shukla R, Nemade S, Shinde K. Comparison of visual analogue scale (VAS) and the Nasal Obstruction Symptom Evaluation (NOSE) score in evaluation of post septoplasty patients. World Journal of Otorhinolaryngology - Head and Neck Surgery. 2020;6.
34. Lim M, Lew-Gor S, Darby Y, Brookes N, Scadding G, Lund VJ. The relationship between subjective assessment instruments in chronic rhinosinusitis. Rhinology. 2007;45(2):144-7.
35. Hendry J, Chin A, Swan IR, Akeroyd MA, Browning GG. The Glasgow Benefit Inventory: a systematic review of the use and value of an otorhinolaryngological generic patient-recorded outcome measure. Clin Otolaryngol. 2016;41(3):259-75.
36. Konstantinidis I, Triaridis S, Triaridis A, Karagiannidis K, Kontzoglou G. Long term results following nasal septal surgery. Focus on patients' satisfaction. Auris Nasus Larynx. 2005;32(4):369-74.
37. Lins L, Carvalho FM. SF-36 total score as a single measure of health-related quality of life: Scoping review. SAGE Open Med. 2016;4:2050312116671725.
38. Meulen M, Zamanipoor Najafabadi A, Lobatto D, Andela C, Vlieland T, Pereira A, et al. SF-12 or SF-36 in pituitary disease? Toward concise and comprehensive patient-reported outcomes measurements. Endocrine. 2020;70.
39. Døsen LK, Kvinnesland K, TarAngen M, Shiryaeva O, Gay C, Haye R. Unilateral and Bilateral PNIF in Quality Control of Nasal Septal Surgery. Int J Otolaryngol. 2018;2018:7846843.
40. Valsamidis K, Titelis K, Rachovitsas D, Konstantinidis I, Markou K, Triaridis S. Long-Term Evaluation of Nasal Septoplasty Followed by Inferior Turbinate Cauterization for the Treatment of Nasal Obstruction Using Objective and Subjective Methods. International Archives of Otorhinolaryngology. 2018;22.
41. van Egmond M, Rovers MM, Hannink G, Hendriks CTM, van Heerbeek N. Septoplasty with or without concurrent turbinate surgery versus non-surgical management for nasal obstruction in adults with a deviated septum: a pragmatic, randomised controlled trial. Lancet. 2019;394(10195):314-21.
42. Swedish National Septoplasty Register (SNSR) [Available from: https://sep.registercentrum.se/.
43. Pedersen L, Schiöler L, Finjan S, Davidsson Å, Sunnergren O, Holmberg K, et al. Prognostic factors for outcome after septoplasty in 888 patients from the Swedish National Septoplasty Register. Eur Arch Otorhinolaryngol. 2019;276(8):2223-8.

44. Pedersen L, Schiöler L, Holmberg K, Ahlström Emanuelsson C, Hellgren J. Age and Unplanned Postoperative Visits Predict Outcome after Septoplasty: A National Swedish Register Study. Int J Otolaryngol. 2018;2018:2379536.
45. Swedish National Patient Register (PAR) [Available from: https://www.socialstyrelsen.se/statistik-och-data/register/patientregistret/.
46. SKR - om nationella kvalitetsregister [Available from: https://skr.se/en/kvalitetsregister/omnationellakvalitetsregister.52218.html.
47. M R. Översyn av de nationella kvalitetsregistren - Guldgruvan i hälso- och sjukvården. 2010.
48. Thygesen LC, Ersbøll AK. When the entire population is the sample: strengths and limitations in register-based epidemiology. Eur J Epidemiol. 2014;29(8):551-8.
49. Varnum C, Pedersen AB, Gundtoft PH, Overgaard S. The what, when and how of orthopaedic registers: an introduction into register-based research. EFORT Open Rev [Internet]. 2019 2019/06//; 4(6):[337-43 pp.]. Available from: http://europepmc.org/abstract/MED/31210972

https://doi.org/10.1302/2058-5241.4.180097

https://europepmc.org/articles/PMC6549105

https://europepmc.org/articles/PMC6549105?pdf=render.
50. Compton J, Glass N, Fowler T. Evidence of Selection Bias and Non-Response Bias in Patient Satisfaction Surveys. Iowa Orthop J. 2019;39(1):195-201.
51. Edwards PJ, Roberts I, Clarke MJ, Diguiseppi C, Wentz R, Kwan I, et al. Methods to increase response to postal and electronic questionnaires. Cochrane Database Syst Rev. 2009;2009(3):Mr000008.
52. Zaslavsky AM, Zaborski LB, Cleary PD. Factors affecting response rates to the Consumer Assessment of Health Plans Study survey. Med Care. 2002;40(6):485-99.
53. Austin PC, White IR, Lee DS, van Buuren S. Missing Data in Clinical Research: A Tutorial on Multiple Imputation. Can J Cardiol. 2021;37(9):1322-31.
54. Moore M, Eccles R. Objective evidence for the efficacy of surgical management of the deviated septum as a treatment for chronic nasal obstruction: a systematic review. Clin Otolaryngol. 2011;36(2):106-13.
55. Holmstrom M. The use of objective measures in selecting patients for septal surgery. Rhinology. 2010;48(4):387-93.
56. Srinivasan DG, Hegde J, Ramasamy K, Raja K, Rajaa S, Ganesan S, et al. Comparison of the Efficacy of Septoplasty with Nonsurgical Management in Improving Nasal Obstruction in Patients with Deviated Nasal Septum - A Randomized Clinical Trial. Int Arch Otorhinolaryngol. 2022;26(2):e226-e32.

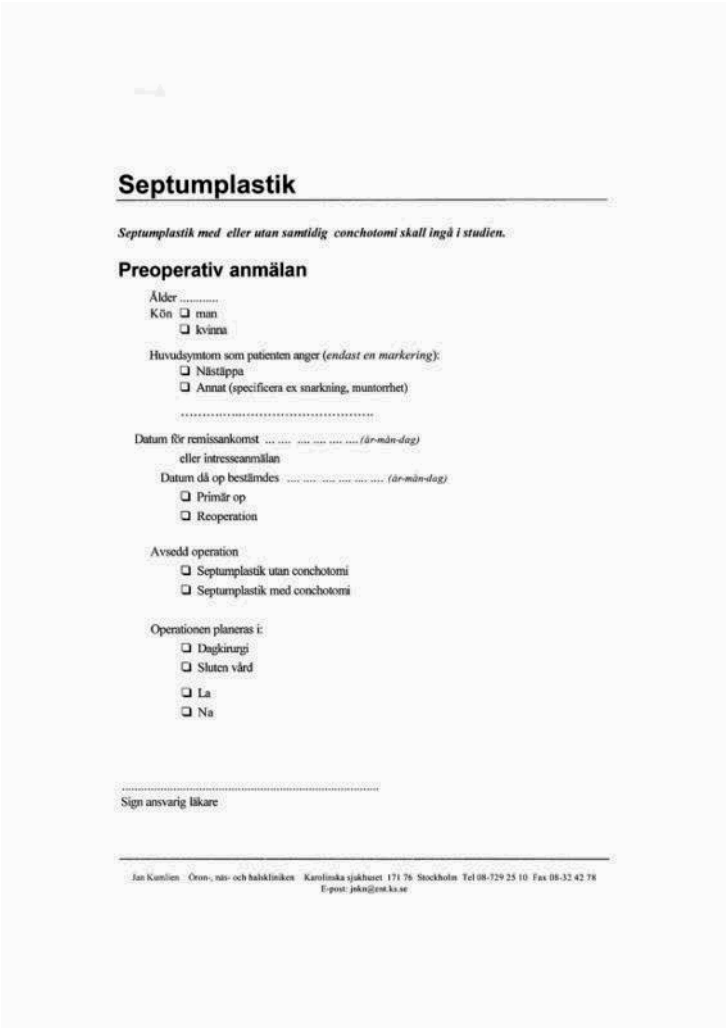
57. Rennie K, O'Hara J, Rousseau N, Stocken D, Howel D, Ternent L, et al. Nasal Airway Obstruction Study (NAIROS): A phase III, open-label, mixed-methods, multicentre randomised controlled trial of septoplasty versus medical management of a septal deviation with nasal obstruction. Trials. 2020;21.
58. Sipilä J, Suonpää J. A prospective study using rhinomanometry and patient clinical satisfaction to determine if objective measurements of nasal airway resistance can improve the quality of septoplasty. Eur Arch Otorhinolaryngol. 1997;254(8):387-90.
59. Jessen M, Malm L. The spontaneous course of nasal obstruction in patients with normal nasal airway resistance. Clin Otolaryngol Allied Sci. 1991;16(3):302-4.
60. Thulesius H, Thulesius H, Jessen M. What happens to patients with nasal stuffiness and pathological rhinomanometry left without surgery? Rhinology. 2009;47:24-7.
61. Lindemann J, Tsakiropoulou E, Konstantinidis I, Lindemann K. Normal aging does not deteriorate nose-related quality of life: Assessment with "NOSE" and "SNOT-20" questionnaires. Auris Nasus Larynx. 2010;37(3):303-7.
62. Janovic N, Janovic A, Milicic B, Djuric M. Is Computed Tomography Imaging of Deviated Nasal Septum Justified for Obstruction Confirmation? Ear Nose Throat J. 2021;100(2):Np131-np6.
63. Corredor-Rojas G, García-Chabur MA, Castellanos J, Moreno S, Pinzón M, Peñaranda A. Nasal Obstruction and Quality of Life Assessment After Septoplasty With Turbinoplasty: Correlation Between Subjective Scales. American Journal of Rhinology & Allergy. 2020;35(5):568-73.
64. Rhee JS, Sullivan CD, Frank DO, Kimbell JS, Garcia GJ. A systematic review of patient-reported nasal obstruction scores: defining normative and symptomatic ranges in surgical patients. JAMA Facial Plast Surg. 2014;16(3):219-25; quiz 32.
65. Bensken WP, Pieracci FM, Ho VP. Basic Introduction to Statistics in Medicine, Part 1: Describing Data. Surg Infect (Larchmt). 2021;22(6):590-6.
66. Szumilas M. Explaining odds ratios. J Can Acad Child Adolesc Psychiatry. 2010;19(3):227-9.
67. Glossary of statistical terms 2022 [Available from: glossary.pdf (hbiostat.org).
68. Biau DJ, Jolles BM, Porcher R. P value and the theory of hypothesis testing: an explanation for new researchers. Clin Orthop Relat Res. 2010;468(3):885-92.
69. Warner P. Ordinal logistic regression. J Fam Plann Reprod Health Care. 2008;34(3):169-70.
70. Pedersen AB, Mikkelsen EM, Cronin-Fenton D, Kristensen NR, Pham TM, Pedersen L, et al. Missing data and multiple imputation in clinical epidemiological research. Clin Epidemiol. 2017;9:157-66.

71. Habesoglu M, Kilic O, Caypinar B, Onder S. Aging as the Impact Factor on Septoplasty Success. The Journal of craniofacial surgery. 2015;26.
72. Hytönen ML, Lilja M, Mäkitie AA, Sintonen H, Roine RP. Does septoplasty enhance the quality of life in patients? Eur Arch Otorhinolaryngol. 2012;269(12):2497-503.
73. van Dijk JFM, Zaslansky R, van Boekel RLM, Cheuk-Alam JM, Baart SJ, Huygen F, et al. Postoperative Pain and Age: A Retrospective Cohort Association Study. Anesthesiology. 2021;135(6):1104-19.
74. Gagliese L, Weizblit N, Ellis W, Chan VWS. The measurement of postoperative pain: a comparison of intensity scales in younger and older surgical patients. Pain. 2005;117(3):412-20.
75. Sommer M, Geurts JW, Stessel B, Kessels AG, Peters ML, Patijn J, et al. Prevalence and predictors of postoperative pain after ear, nose, and throat surgery. Arch Otolaryngol Head Neck Surg. 2009;135(2):124-30.
76. Koivisto JM, Saarinen I, Kaipia A, Puukka P, Kivinen K, Laine KM, et al. Patient education in relation to informational needs and postoperative complications in surgical patients. Int J Qual Health Care. 2020;32(1):35-40.
77. Thompson AE, Anisimowicz Y, Miedema B, Hogg W, Wodchis WP, Aubrey-Bassler K. The influence of gender and other patient characteristics on health care-seeking behaviour: a QUALICOPC study. BMC Fam Pract. 2016;17:38.
78. Macsali F, Svanes C, Sothern RB, Benediktsdóttir B, Bjørge L, Dratva J, et al. Menstrual cycle and respiratory symptoms in a general Nordic-Baltic population. Am J Respir Crit Care Med. 2013;187 4:366-73.
79. LoMauro A, Aliverti A. Sex differences in respiratory function. Breathe (Sheff). 2018;14(2):131-40.
80. Sipilä JI, Suonpää JT, Kortekangas AE, Laippala PT. Rhinomanometry before Septoplasty: An Approach to Clinical Material with Diverse Nasal Symptoms. Am J Rhinol. 1992;6(1):17-22.
81. Tsang CLN, Nguyen T, Sivesind T, Cervin A. Long-term patient-related outcome measures of septoplasty: a systematic review. Eur Arch Otorhinolaryngol. 2018;275(5):1039-48.
82. Bugten V, Nilsen AH, Thorstensen WM, Moxness MH, Amundsen MF, Nordgård S. Quality of life and symptoms before and after nasal septoplasty compared with healthy individuals. BMC Ear Nose Throat Disord. 2016;16:13.
83. Kempfle JS, BuSaba NY, Dobrowski JM, Westover MB, Bianchi MT. A cost-effectiveness analysis of nasal surgery to increase continuous positive airway pressure adherence in sleep apnea patients with nasal obstruction. Laryngoscope. 2017;127(4):977-83.
84. Egmond M, Grutters J, Hannink G, Heerbeek N, Rovers M. Septoplasty versus non-surgical management for nasal obstruction in adults

with a deviated septum: economic evaluation alongside a randomized controlled trial. BMC Med. 2020;18:101.
85. Cardell LO, Olsson P, Andersson M, Welin KO, Svensson J, Tennvall GR, et al. TOTALL: high cost of allergic rhinitis-a national Swedish population-based questionnaire study. NPJ Prim Care Respir Med. 2016;26:15082.
86. Karlsson TR, Shakeel M, Al-Adhami A, Suhailee S, Ram B, Ah-See KW. Revision nasal surgery after septoplasty: trainees versus trainers. Eur Arch Otorhinolaryngol. 2013;270(12):3063-7.
87. Kamani T, Yılmaz T, Sürücü S, Bajin MD, Günaydın R, Kuşçu O. Histopathological changes in nasal mucosa with nasal septum deviation. Eur Arch Otorhinolaryngol. 2014;271(11):2969-74.
88. Kumar L, Belaldavar BP, Bannur H. Influence of Deviated Nasal Septum on Nasal Epithelium: An Analysis. Head Neck Pathol. 2017;11(4):501-5.
89. Malik J, Spector BM, Wu Z, Markley J, Zhao S, Otto BA, et al. Evidence of Nasal Cooling and Sensory Impairments Driving Patient Symptoms With Septal Deviation. The Laryngoscope. 2021;132.
90. Malik J, Li C, Maza G, Farag AA, Krebs JP, McGhee S, et al. Computational fluid dynamic analysis of aggressive turbinate reductions: is it a culprit of empty nose syndrome? International forum of allergy & rhinology. 2019;9(8):891-9.
91. Hopkins C. Patient reported outcome measures in rhinology. Rhinology. 2009;47(1):10-7.

APPENDIX

SNSR Preoperative questionnaire (doctor) – 1997-2013



Septumplastik

Septumplastik med eller utan samtidig conchotomi skall ingå i studien.

Preoperativ anmälan

Ålder .....
Kön ❑ man
❑ kvinna

Huvudsymtom som patienten anger (*endast en markering*):
❑ Nästäppa
❑ Annat (specificera ex snarkning, muntorrhet)

.....

Datum för remissankomst ... . *(år-mån-dag)*
eller intresseanmälan
Datum då op bestämdes .... *(år-mån-dag)*
❑ Primär op
❑ Reoperation

Avsedd operation
❑ Septumplastik utan conchotomi
❑ Septumplastik med conchotomi

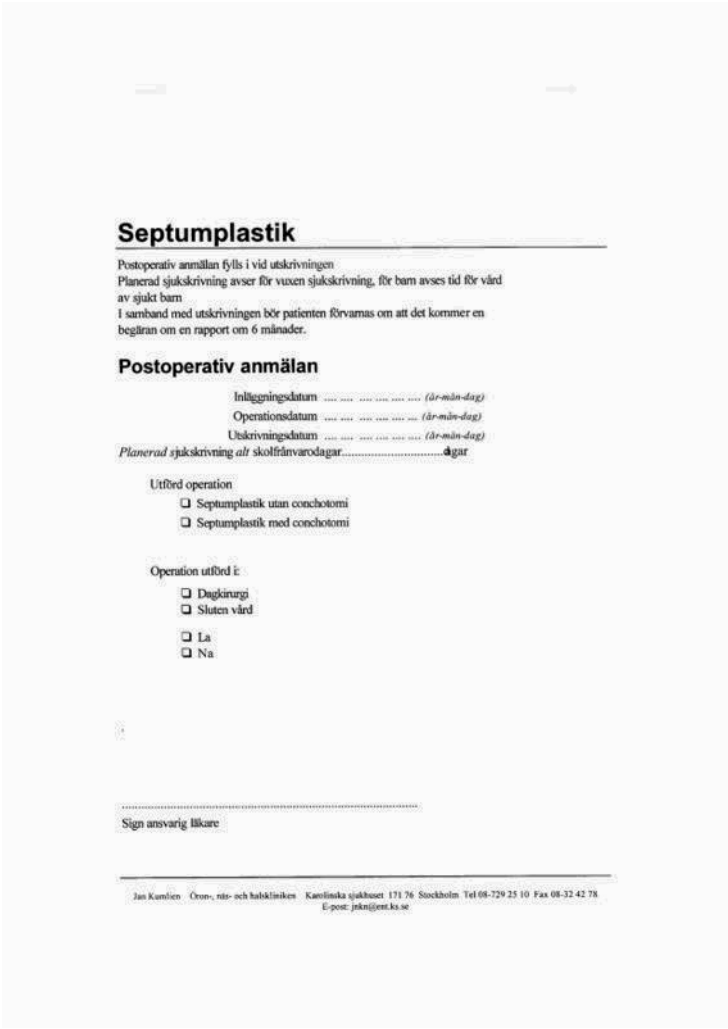
Operationen planeras i:
❑ Dagkirurgi
❑ Sluten vård

❑ La
❑ Na

.....
Sign ansvarig läkare

Jan Kumlien Öron-, näs- och halskliniken Karolinska sjukhuset 171 76 Stockholm Tel 08-729 25 10 Fax 08-32 42 78
E-post: jokn@ent.ks.se

SNSR Postoperative questionnaire (doctor) – 1997-2013



Septumplastik

Postoperativ anmälan fylls i vid utskrivningen
Planerad sjukskrivning avser för vuxen sjukskrivning, för barn avses tid för vård av sjukt barn
I samband med utskrivningen bör patienten förvarnas om att det kommer en begäran om en rapport om 6 månader.

Postoperativ anmälan

Inläggningsdatum .... *(år-mån-dag)*
Operationsdatum .... *(år-mån-dag)*
Utskrivningsdatum .... *(år-mån-dag)*
Planerad sjukskrivning *alt* skolfrånvarodagar.....dagar

Utförd operation
- ❑ Septumplastik utan conchotomi
- ❑ Septumplastik med conchotomi

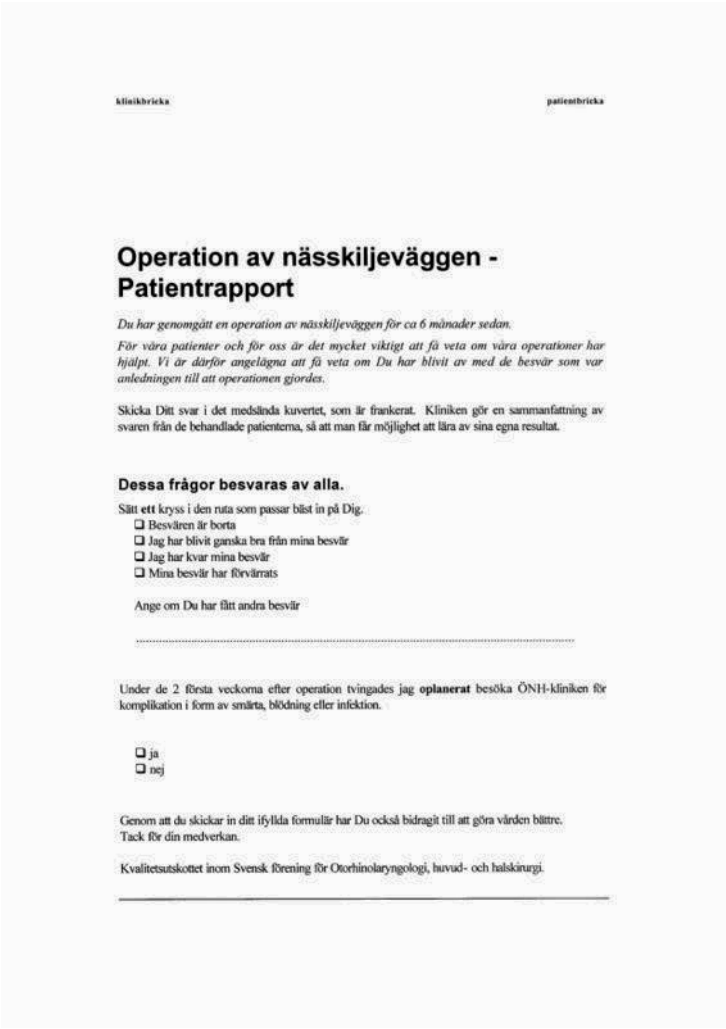
Operation utförd i:
- ❑ Dagkirurgi
- ❑ Sluten vård

- ❑ La
- ❑ Na

.....
Sign ansvarig läkare

Jan Kumlien Öron-, näs- och halskliniken Karolinska sjukhuset 171 76 Stockholm Tel 08-729 25 10 Fax 08-32 42 78
E-post: jnkn@ent.ks.se

SNSR Postoperative questionnaire (patient) – 1997-2013



klinikbricka patientbricka

Operation av nässkiljeväggen - Patientrapport

Du har genomgått en operation av nässkiljeväggen för ca 6 månader sedan.

För våra patienter och för oss är det mycket viktigt att få veta om våra operationer har hjälpt. Vi är därför angelägna att få veta om Du har blivit av med de besvär som var anledningen till att operationen gjordes.

Skicka Ditt svar i det medsända kuvertet, som är frankerat. Kliniken gör en sammanfattning av svaren från de behandlade patienterna, så att man får möjlighet att lära av sina egna resultat.

Dessa frågor besvaras av alla.

Sätt **ett** kryss i den ruta som passar bäst in på Dig.

- ❑ Besvären är borta
- ❑ Jag har blivit ganska bra från mina besvär
- ❑ Jag har kvar mina besvär
- ❑ Mina besvär har förvärrats

Ange om Du har fått andra besvär

.....

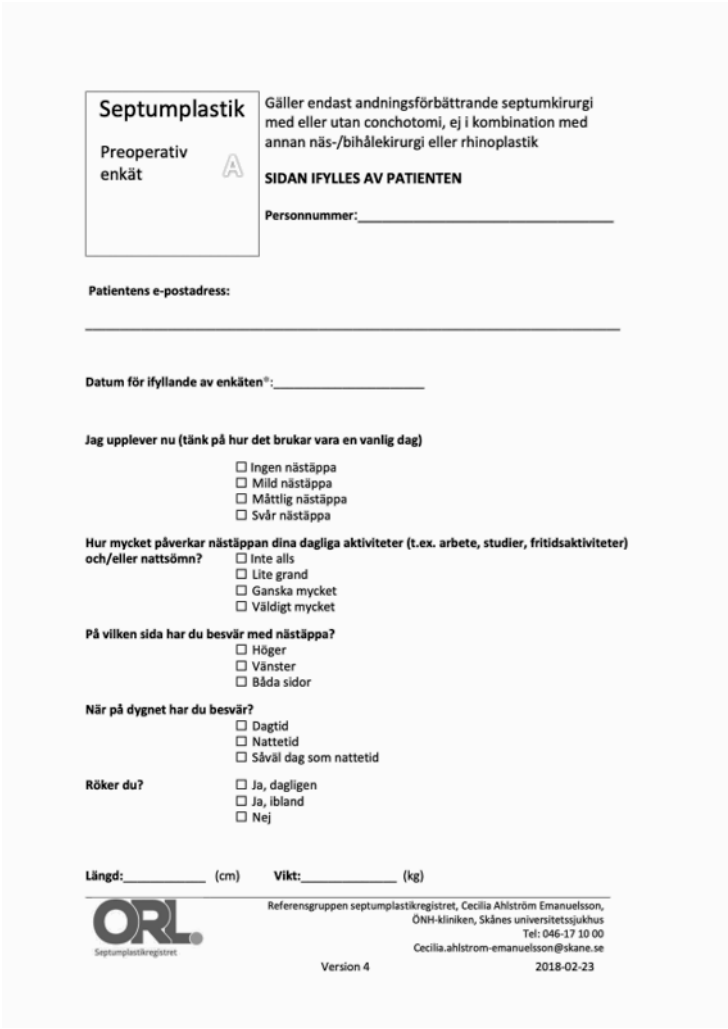
Under de 2 första veckorna efter operation tvingades jag **oplanerat** besöka ÖNH-kliniken för komplikation i form av smärta, blödning eller infektion.

- ❑ ja
- ❑ nej

Genom att du skickar in ditt ifyllda formulär har Du också bidragit till att göra vården bättre.
Tack för din medverkan.

Kvalitetsutskottet inom Svensk förening för Otorhinolaryngologi, huvud- och halskirurgi.

SNSR Preoperative questionnaire A (patient) – 2013-



Septumplastik

Preoperativ enkät

A

Gäller endast andningsförbättrande septumkirurgi med eller utan conchotomi, ej i kombination med annan näs-/bihålekirurgi eller rhinoplastik

SIDAN IFYLLES AV PATIENTEN

Personnummer:_____

Patientens e-postadress:

_____

Datum för ifyllande av enkäten*:_____

Jag upplever nu (tänk på hur det brukar vara en vanlig dag)

- ☐ Ingen nästäppa
- ☐ Mild nästäppa
- ☐ Måttlig nästäppa
- ☐ Svår nästäppa

Hur mycket påverkar nästäppan dina dagliga aktiviteter (t.ex. arbete, studier, fritidsaktiviteter) och/eller nattsömn?

- ☐ Inte alls
- ☐ Lite grand
- ☐ Ganska mycket
- ☐ Väldigt mycket

På vilken sida har du besvär med nästäppa?

- ☐ Höger
- ☐ Vänster
- ☐ Båda sidor

När på dygnet har du besvär?

- ☐ Dagtid
- ☐ Nattetid
- ☐ Såväl dag som nattetid

Röker du?

- ☐ Ja, dagligen
- ☐ Ja, ibland
- ☐ Nej

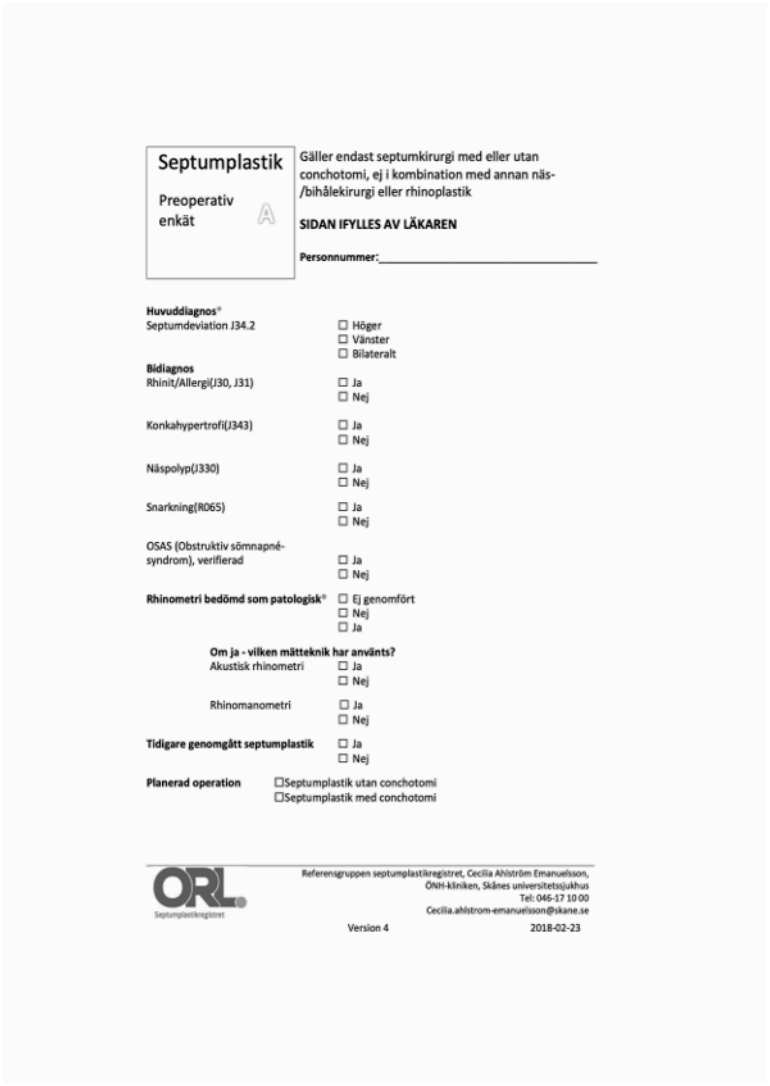
Längd:_____ (cm) **Vikt:**_____ (kg)

ORL Septumplastikregistret

Referensgruppen septumplastikregistret, Cecilia Ahlström Emanuelsson, ÖNH-kliniken, Skånes universitetssjukhus
Tel: 046-17 10 00
Cecilia.ahlstrom-emanuelsson@skane.se

Version 4 2018-02-23

SNSR Preoperative questionnaire A (doctor) – 2013-



Septumplastik

Preoperativ enkät A

Gäller endast septumkirurgi med eller utan conchotomi, ej i kombination med annan näs-/bihålekirurgi eller rhinoplastik

SIDAN IFYLLES AV LÄKAREN

Personnummer:_____

Huvuddiagnos*
Septumdeviation J34.2
☐ Höger
☐ Vänster
☐ Bilateralt

Bidiagnos
Rhinit/Allergi(J30, J31) ☐ Ja ☐ Nej

Konkahypertrofi(J343) ☐ Ja ☐ Nej

Näspolyp(J330) ☐ Ja ☐ Nej

Snarkning(R065) ☐ Ja ☐ Nej

OSAS (Obstruktiv sömnapné-syndrom), verifierad ☐ Ja ☐ Nej

Rhinometri bedömd som patologisk* ☐ Ej genomfört ☐ Nej ☐ Ja

Om ja - vilken mätteknik har använts?
Akustisk rhinometri ☐ Ja ☐ Nej

Rhinomanometri ☐ Ja ☐ Nej

Tidigare genomgått septumplastik ☐ Ja ☐ Nej

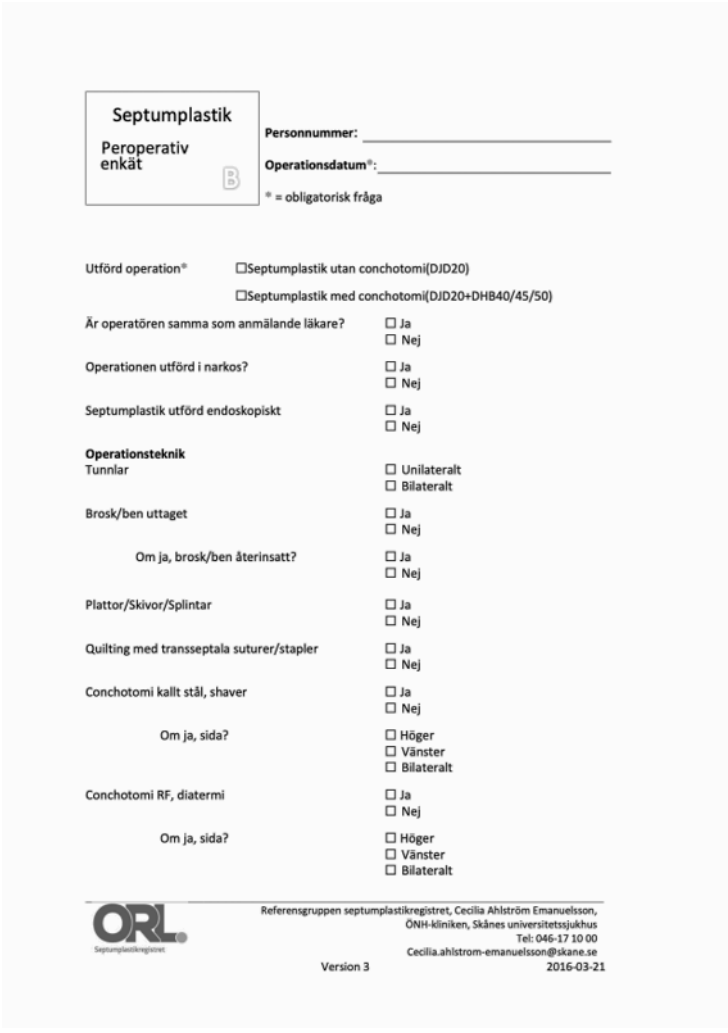
Planerad operation ☐Septumplastik utan conchotomi ☐Septumplastik med conchotomi

ORL Septumplastikregistret

Referensgruppen septumplastikregistret, Cecilia Ahlström Emanuelsson, ÖNH-kliniken, Skånes universitetssjukhus
Tel: 046-17 10 00
Cecilia.ahlstrom-emanuelsson@skane.se

Version 4 2018-02-23

SNSR Peroperative questionnaire B (doctor) – 2013-



Septumplastik

Peroperativ enkät

B

Personnummer: _____

Operationsdatum*: _____

* = obligatorisk fråga

Utförd operation* ☐Septumplastik utan conchotomi(DJD20)

☐Septumplastik med conchotomi(DJD20+DHB40/45/50)

Är operatören samma som anmälande läkare? ☐ Ja ☐ Nej

Operationen utförd i narkos? ☐ Ja ☐ Nej

Septumplastik utförd endoskopiskt ☐ Ja ☐ Nej

Operationsteknik

Tunnlar ☐ Unilateralt ☐ Bilateralt

Brosk/ben uttaget ☐ Ja ☐ Nej

Om ja, brosk/ben återinsatt? ☐ Ja ☐ Nej

Plattor/Skivor/Splintar ☐ Ja ☐ Nej

Quilting med transseptala suturer/stapler ☐ Ja ☐ Nej

Conchotomi kallt stål, shaver ☐ Ja ☐ Nej

Om ja, sida? ☐ Höger ☐ Vänster ☐ Bilateralt

Conchotomi RF, diatermi ☐ Ja ☐ Nej

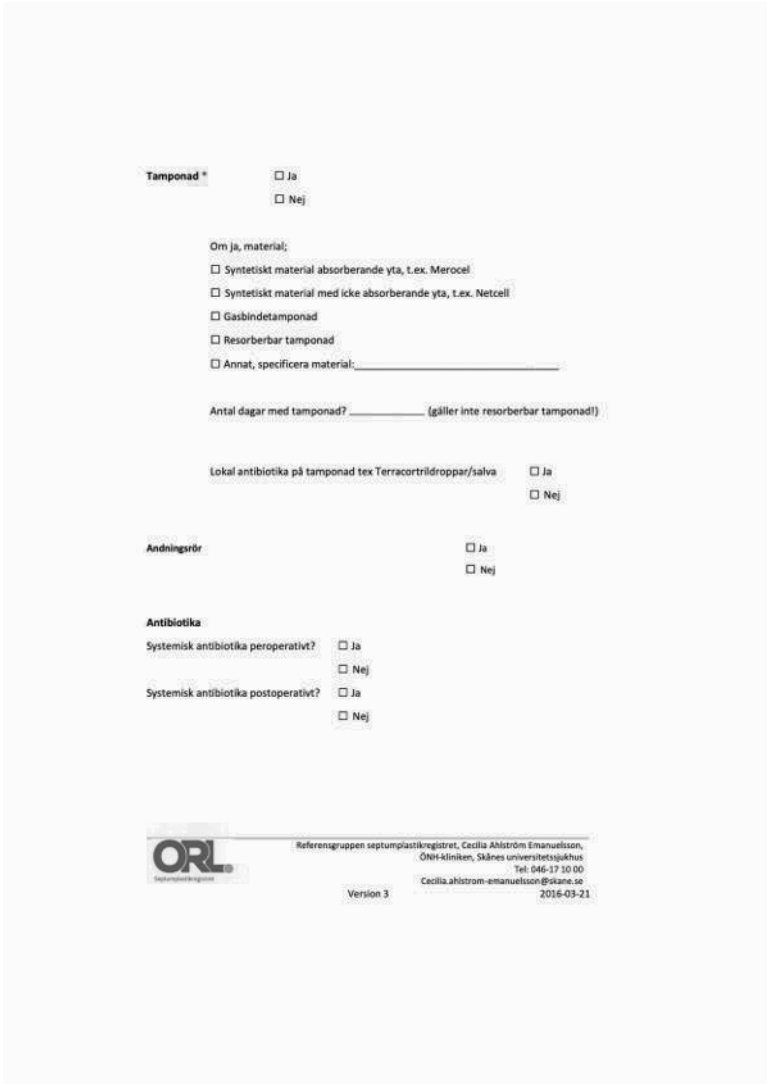
Om ja, sida? ☐ Höger ☐ Vänster ☐ Bilateralt

ORL Septumplastikregistret

Referensgruppen septumplastikregistret, Cecilia Ahlström Emanuelsson, ÖNH-kliniken, Skånes universitetssjukhus
Tel: 046-17 10 00
Cecilia.ahlstrom-emanuelsson@skane.se

Version 3 2016-03-21

SNSR Peroperative questionnaire B continue – 2013-



Tamponad * ☐ Ja
☐ Nej

Om ja, material;
☐ Syntetiskt material absorberande yta, t.ex. Merocel
☐ Syntetiskt material med icke absorberande yta, t.ex. Netcell
☐ Gasbindetamponad
☐ Resorberbar tamponad
☐ Annat, specificera material:_____

Antal dagar med tamponad? _____ (gäller inte resorberbar tamponad!)

Lokal antibiotika på tamponad tex Terracortrildroppar/salva ☐ Ja
☐ Nej

Andningsrör ☐ Ja
☐ Nej

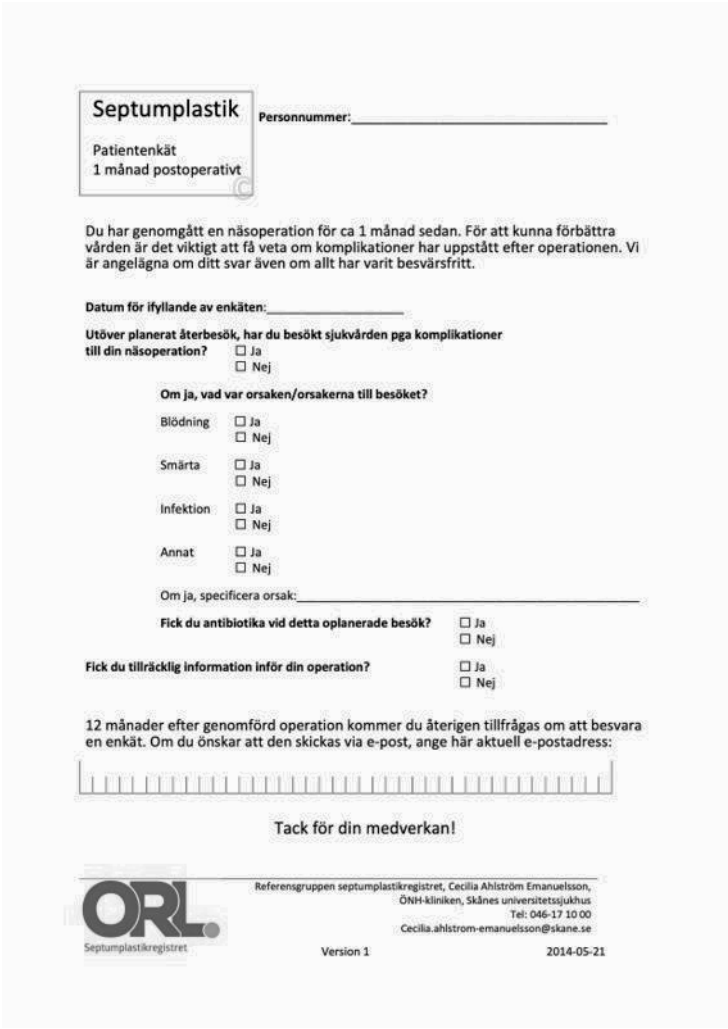
Antibiotika

Systemisk antibiotika peroperativt? ☐ Ja
☐ Nej

Systemisk antibiotika postoperativt? ☐ Ja
☐ Nej

ORL
Referensgruppen septumplastikregistret, Cecilia Ahlström Emanuelsson,
ÖNH-kliniken, Skånes universitetssjukhus
Tel: 046-17 10 00
Cecilia.ahlstrom-emanuelsson@skane.se
Version 3 2016-03-21

SNSR Postoperative questionnaire C (patient 1 month) – 2013-



Septumplastik

Patientenkät
1 månad postoperativt

Personnummer:_____

Du har genomgått en näsoperation för ca 1 månad sedan. För att kunna förbättra vården är det viktigt att få veta om komplikationer har uppstått efter operationen. Vi är angelägna om ditt svar även om allt har varit besvärsfritt.

Datum för ifyllande av enkäten:_____

Utöver planerat återbesök, har du besökt sjukvården pga komplikationer till din näsoperation? ☐ Ja ☐ Nej

Om ja, vad var orsaken/orsakerna till besöket?

Blödning ☐ Ja ☐ Nej

Smärta ☐ Ja ☐ Nej

Infektion ☐ Ja ☐ Nej

Annat ☐ Ja ☐ Nej

Om ja, specificera orsak:_____

Fick du antibiotika vid detta oplanerade besök? ☐ Ja ☐ Nej

Fick du tillräcklig information inför din operation? ☐ Ja ☐ Nej

12 månader efter genomförd operation kommer du återigen tillfrågas om att besvara en enkät. Om du önskar att den skickas via e-post, ange här aktuell e-postadress:

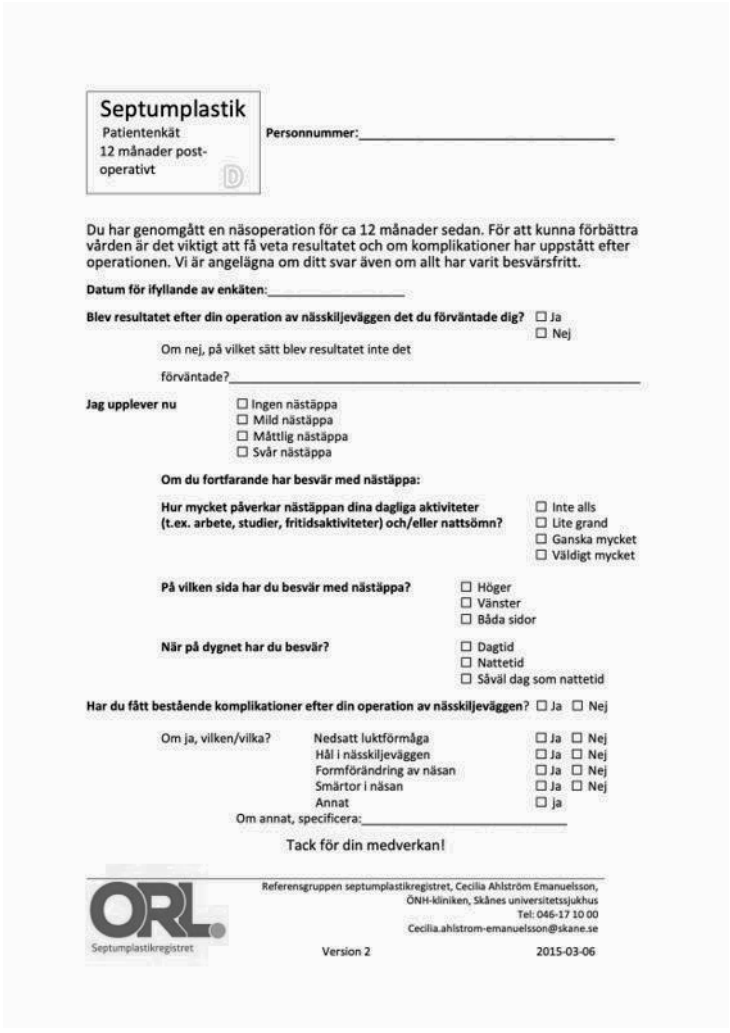
Tack för din medverkan!

ORL
Septumplastikregistret

Referensgruppen septumplastikregistret, Cecilia Ahlström Emanuelsson, ÖNH-kliniken, Skånes universitetssjukhus
Tel: 046-17 10 00
Cecilia.ahlstrom-emanuelsson@skane.se

Version 1 2014-05-21

SNSR Postoperative Questionnaire D (patient 12 months) – 2013-



Septumplastik
Patientenkät
12 månader post-operativt
D

Personnummer:_____

Du har genomgått en näsoperation för ca 12 månader sedan. För att kunna förbättra vården är det viktigt att få veta resultatet och om komplikationer har uppstått efter operationen. Vi är angelägna om ditt svar även om allt har varit besvärsfritt.

Datum för ifyllande av enkäten:_____

Blev resultatet efter din operation av nässkiljeväggen det du förväntade dig? ☐ Ja ☐ Nej

Om nej, på vilket sätt blev resultatet inte det förväntade?_____

Jag upplever nu
- ☐ Ingen nästäppa
- ☐ Mild nästäppa
- ☐ Måttlig nästäppa
- ☐ Svår nästäppa

Om du fortfarande har besvär med nästäppa:

Hur mycket påverkar nästäppan dina dagliga aktiviteter (t.ex. arbete, studier, fritidsaktiviteter) och/eller nattsömn?
- ☐ Inte alls
- ☐ Lite grand
- ☐ Ganska mycket
- ☐ Väldigt mycket

På vilken sida har du besvär med nästäppa?
- ☐ Höger
- ☐ Vänster
- ☐ Båda sidor

När på dygnet har du besvär?
- ☐ Dagtid
- ☐ Nattetid
- ☐ Såväl dag som nattetid

Har du fått bestående komplikationer efter din operation av nässkiljeväggen? ☐ Ja ☐ Nej

Om ja, vilken/vilka?

Nedsatt luktförmåga	☐ Ja	☐ Nej
Hål i nässkiljeväggen	☐ Ja	☐ Nej
Formförändring av näsan	☐ Ja	☐ Nej
Smärtor i näsan	☐ Ja	☐ Nej
Annat	☐ ja	

Om annat, specificera:_____

Tack för din medverkan!

Referensgruppen septumplastikregistret, Cecilia Ahlström Emanuelsson, ÖNH-kliniken, Skånes universitetssjukhus
Tel: 046-17 10 00
Cecilia.ahlstrom-emanuelsson@skane.se

ORL Septumplastikregistret

Version 2 2015-03-06

Nose-VAS used in paper III (pre- and postoperative)

Navn: Diagnose:

Alder:

SSK-skjema for nese-bihule-symptomer

Høyde: Vekt: BMI: Allergi: Astma: Yrke:

Antall sigaretter om dagen: I hvor mange år:

Tett nese	Helt åpen	Helt tett
Munnpusting	Aldri	Alltid
Snorking	Aldri	Alltid
Pustepauser under søvn	Aldri	Alltid
Renning fra nesen	Aldri	Alltid
Hodepine	Aldri	Alltid
Smerter i tenner/midtannsikt	Aldri	Alltid
Bihulebetennelse	Aldri	Alltid
Hoste	Aldri	Alltid
Nysing	Aldri	Alltid
Nedsatt allmenntilstand	Aldri	Alltid
Nedsatt luktesans	Aldri	Alltid