

Received: 2015.03.30
Accepted: 2015.05.15
Published: 2015.06.22

An Improved Instrument Table for Use in Functional Endoscopic Sinus Surgery

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Statistical Analysis C
Data Interpretation D
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Source of support: The study was supported by KARL STORZ GmbH & Co. KG in Tuttlingen, Germany, which offered the surgical systems and technical support and was developmental collaborator without influencing the current study

Background: The clinical motivation for the current study was that various instrument tables are located far away from the patient's head, and the only way for the surgeon to access an instrument is via a scrub nurse. Thus, the idea for this study was the development and evaluation of an improved and conveniently positioned instrument table.


Material/Methods: An improved instrument table (IT) was designed, built, and tested. We assessed its use in 150 surgeries from 1 October 2013 to 30 June 2014 (group A), and another 150 surgeries without use of the IT from 1 February 2013 to 31 October 2014 as a control group (group B).

Results: With use of the improved IT during functional endoscopic sinus surgery (FESS), preparation-time was extended by 0.1 min and the SLOT-time was reduced by 19.6%. The number of different instruments (35.3%) used was reduced, as well as the number of manual interactions with instruments (7.8%) and the number of manual interactions with the scrub nurse (66.1%). In addition, the ergonomics with use of the IT improved by 40.0%. The only potential disadvantage was a reduction of working space and thereby a constraint of the scope. Compared to the benefits, this problem is minor.

Conclusions: Conclusively, the improved IT is of value for everyday use in surgery and offers a great benefit for FESS, and may be useful in other kinds of surgery (e.g., duraplasty).

MeSH Keywords: **Endoscopy • Equipment and Supplies • Ethmoid Sinus • Otorhinolaryngologic Surgical Procedures**

Full-text PDF: <http://www.basic.medscimonit.com/abstract/index/idArt/894265>

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Background

Among other diseases, in terms of a chronic rhinosinusitis as well as a polyposis, functional endoscopic sinus surgery (FESS) is the operation of choice if a medicamentous therapy provides no significant improvement or cure for the patient [1–3]. However, polyposis is a symptom of inflamed nasal mucosa, not a diagnosis itself [4,5].

The instrument exchange and the interaction between ENT surgeon and scrub nurse is a very frequent manual maneuver during FESS. Further, it seems to have a significant influence on the SLOT-time, number of instruments, number of interactions, and ergonomic situation.

The clinical motivation for the current study was that different individual instrument tables were located far away from the patient's head, and the only way for the surgeon to take an instrument is via a scrub nurse. Thus, the idea of this study was the development and evaluation of an improved and conveniently positioned instrument table with holding tunnels for the 3 most commonly used instruments, with capacity for cotton and saline for endoscope cleaning, and which can be used as a platform for tissue preparation (e.g., for duraplasty).

The development of an improved instrument table (IT) took place in cooperation with the company KARL STORZ GmbH and Co. KG in Tuttlingen, Germany, and met the following requirements. It enables instrument placement in a standardized and uniform manner, thereby facilitating "blind-grabbing" by the surgeon. Further, it includes an additional fix-point, for the placement of the surgeon's hand or elbow during surgery and it offers short changeover times for the most frequently used instruments.

Based on these qualifications, the improved IT should fulfill the following hypotheses. First, the improved IT should reduce the SLOT-time by a significant reduction of interaction with the instruments and with the scrub nurse. Second, use of the improved IT should lead to a more standardized instrument

table, with the ability to place a small amount of instruments. Finally, it should enhance the ergonomic situation during FESS.

Material and Methods

Subjects

We assessed 150 surgeries using the improved IT from 1 October 2013 to 30 June 2014 (group A) and another 150 surgeries without use of the improved IT from 1 February 2013 to 31 October 2014 as a control group (group B). We also estimated the mean Lund-Mackay Score in both groups [6]. The age and gender distribution was comparable among both groups.

Protocol

A vote of the Ethics Commission was not necessary, due to the unchanged configuration of the operation and the redundant flow of information. Nevertheless, a comprehensive briefing for the patient was carried out in each case.

The improved instrument table (IT)

The improved IT is 0.49 m long and 0.24 m wide, resulting in a surface area of 1.18 m². It is placed closer to the patients' situs than are conventional instrument tables. Thus, it is located closer to the field of action and nearby the surgeon (Figure 1). On the improved IT, 3 instruments (e.g., the straight and the angled Blakesley and the navigation pointer) are stored in holding tunnels in a standardized manner.

Approach

For the evaluation of outcomes of the surgical procedures, several parameters were collected during FESS and compared between the 2 groups with (A) and without (B) application of the improved IT. We estimated the preparation-time, the SLOT-time, the number of different instruments used, and the number of manual interactions with the instruments from their uptake

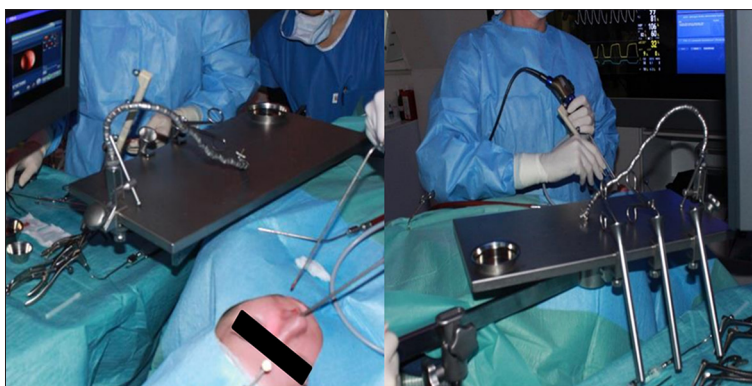


Figure 1. The improved IT placed next to the patient's head during surgery.

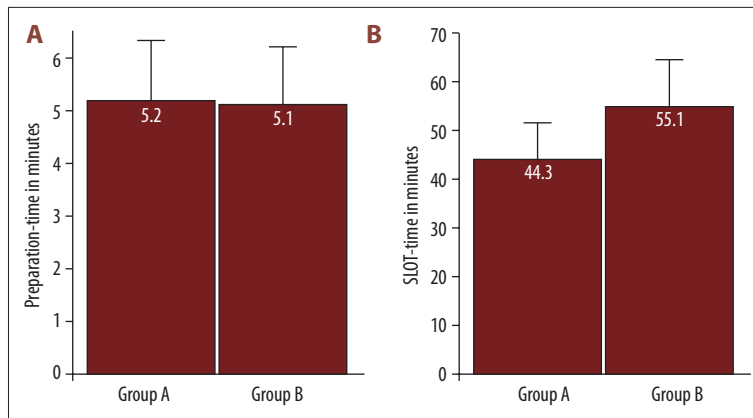


Figure 2. (A) Preparation time in minutes (min) +SD. (B) SLOP-time in min +SD. Group A with the improved IT; group B without application of the improved IT.

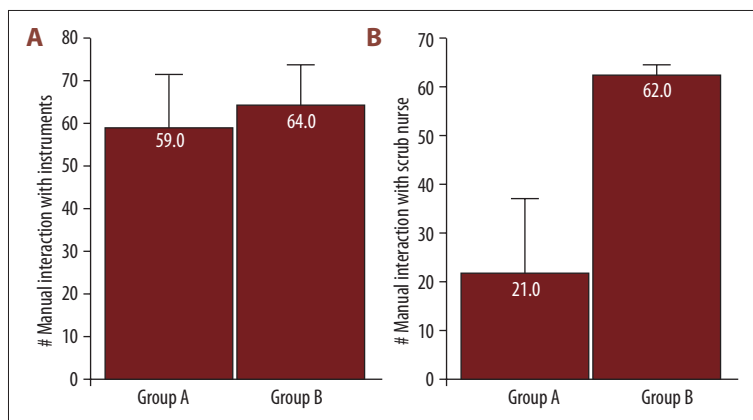


Figure 3. (A) Number (#) of manual interactions with instruments +SD. (B) Number of manual interactions with the scrub nurse +SD. Group A with usage of the improved IT; group B without application of the improved IT.

to their deposition. We also counted the number of interactions between surgeon and scrub nurse for each instrument given to the surgeon and put back. In addition, the ergonomics of instrument interaction was evaluated by grades given by the surgery team, from 1 (very good) to 5 (unsatisfactory).

Results

Times

The mean LMSc was 18.5 ± 2.0 (standard deviation, SD) in group A and 17.9 ± 2.1 (SD) in group B. The preparation-time with the improved IT was 5.2 ± 1.1 min (SD) and without the improved IT was 5.1 ± 1.1 min (SD). Thus, the preparation-time with the improved IT was extended by 0.1 min.

The SLOP-time was 44.3 ± 7.2 min (SD) with the improved IT and 55.1 ± 9.5 min (SD) without, resulting in a reduction of time of 19.6% in group A compared to group B (Figure 2).

Number of manual interactions

The number of different instruments used during FESS was 11.0 ± 2.0 (SD) in group A and 17.0 ± 2.8 (SD) in group B.

Consequently, with application of the improved IT, 35.3% fewer instruments were used.

Regarding the number of manual interactions with instruments from their uptake to their deposition, there were 59.0 ± 11.0 (SD) interactions in group A and 64.0 ± 10.5 (SD) in group B, resulting in a reduction of 7.8% in group A compared to group B.

Further, the number of manual interactions between surgeon and scrub nurse was 21.0 ± 14.0 (SD) in group A and 62.0 ± 1.1 (SD) in group B, resulting in a reduction of interactions of 66.1% in group A in comparison to group B (Figure 3).

Ergonomics

The mean grades concerning the ergonomics of the instrument interaction were 1.5 ± 0.2 (SD) in group A and 2.5 ± 0.9 (SD) in group B. Therefore, the ergonomics improved by 40% with use of the improved IT (Figure 4).

Discussion

The improved IT fulfilled the hypotheses of the current study. The reduction of SLOP-time occurring with use of the improved

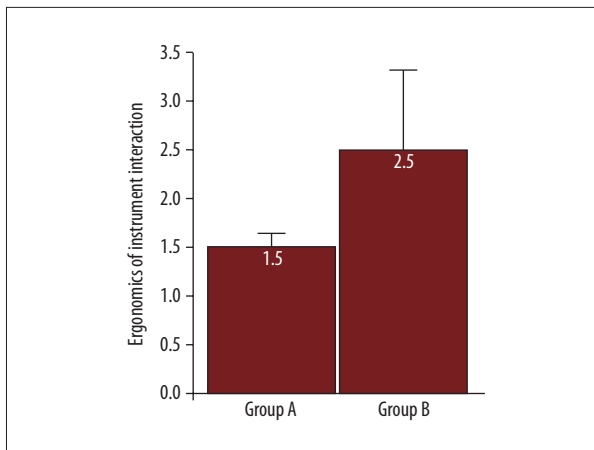


Figure 4. Outcome of the ergonomics of the instrument interaction +SD. Group A with usage of the improved IT; group B without the improved IT.

IT is ascribed to a reduction of the surgeon's interaction with the instruments and the scrub nurse. We also found that use of the improved IT leads to a more standardized instrument table with fewer of the 3 most frequently used instruments. Additionally, the improved IT clearly improves ergonomics during FESS. The International Rhinosinusitis Advisory Board reported that 20% of the population has rhinosinusitis [7]. Further, Bhattacharyya et al. reported about nearly 1 in 3000 adults/year are affected by recurrent acute rhinosinusitis [8]. Since its chronic form is commonly treated by FESS, the importance of improved surgical conditions is obvious [9]. The Federal Office of Statistics reported that there are 438 811

References:

- Fokkens WJ, Lund VJ, Mullol J et al: European position paper on rhinosinusitis and nasal polyps 2012. *Rhinol Suppl*, 2012; 23: 1–299
- Fokkens W, Lund V, Mullol J et al: European position paper on rhinosinusitis and nasal polyps. *Rhinol Suppl*, 2007; 20: 1–136
- Plinkert PK, Hoppe-Tichy T: Erkrankungen von Gesicht, Mittelgesicht und Rhinobasis. Nasennebenhöhlen. Zenner HP (ed.), *Praktische Therapie von HNO-Krankheiten*. 2nd ed. Stuttgart: Schattauer GmbH, 2008; 278 [in German]
- Atsushi K: Immunopathology of chronic rhinosinusitis. *Allergol Int*, 2015; 64(2): 121–30
- Simmen D, Jones N: Optimierung von Diagnostik, medizinischem Management und Planung der Operation. Behandlung der chronischen Rhinosinusitis mit Polyposis. Simmen D, Jones N (eds.), *Chirurgie der Nasennebenhöhlen und der vorderen Schädelbasis*. 1st ed. Stuttgart: Georg Thieme Verlag KG; 2005; 37 [in German]
- Hopkins C, Browne JP, Slack R et al: The Lund-Mackay staging system for chronic rhinosinusitis: how is it used and what does it predict? *Otolaryngol Head Neck Surg*, 2007; 137(4): 555–61
- International Rhinosinusitis Advisory Board. Infectious rhinosinusitis in adults: classification, etiology and management. *Ear Nose Throat J*, 1997; 76: 5–22
- Bhattacharyya N, Grenber J, Martinson NG: Recurrent acute rhinosinusitis: epidemiology and health care cost burden. *Otolaryngol Head Neck Surg*, 2012; 146: 307–12
- Kühnel T, Hosemann W: Nasen und Nasennebenhöhlen. Chirurgische Therapie. In: Strutz J, Mann W (eds.), *Praxis der HNO-Heilkunde, Kopf- und Halschirurgie*. 1st ed. Stuttgart: Georg Thieme Verlag KG; 2001; 460
- Statistisches Bundesamt [Internet]. Fallpauschalenbezogene Krankenhausstatistik (DRG-Statistik) - Operationen und Prozeduren der vollstationären Patientinnen und Patienten der Krankenhäuser 2013. Wiesbaden 2014 – [cited 2015 Feb 2nd]. Available from: <https://www.destatis.de/DE/Publikationen/Thematisch/Gesundheit/Krankenhaeuser/OperationenProzeduren.html> [in German]

such operations performed in Germany every year, 14 515 of them in Sachsen [10], showing the importance of nasal and paranasal surgery in Germany. The only potential disadvantage found was a reduction in the working space, which is already scarce and can reduce the surgeon's scope, but, compared to the benefits, the reduced working space is a minor problem.

Conclusions

The improved IT is clearly advantageous for everyday use in surgery. Due to its advantages of reduction of SLOT-time and manual interactions and the improvement of the ergonomics of instrument interaction, it offers great benefit for FESS and can be of value in other types of surgery such as duraplasty.

Acknowledgments

We would like to thank the company KARL STORZ GmbH & Co. KG in Tuttlingen, Germany, which offered the surgical systems and technical support and was developmental collaborator without influencing the current study. Furthermore, we thank the collaborators of the IRDC and the involved surgeons as well as the surgery team for their broad support.

Declaration of Interest

All authors certify that there is no conflict of interest with any financial organization regarding the material and results discussed in the current study and the authors report no conflicts of interest.