

## Original Research Article

# Chronic rhinosinusitis: is any indication for Caldwell-Luc approach in endoscopic sinus surgery era?

Daniel Lupoi<sup>1,2\*</sup>

<sup>1</sup>Department of ENT, Sfanta Maria Hospital, Bucharest, Romania

<sup>2</sup>Carol Davila, University of Medicine and Pharmacy, Bucharest, Romania

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### \*Correspondence:

Dr. Daniel Lupoi,

E-mail: [daniel.lupoi@yahoo.com](mailto:daniel.lupoi@yahoo.com)

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### ABSTRACT

**Background:** Caldwell-Luc procedure was the gold standard procedure for chronic maxillary sinusitis until the endoscopic sinus surgery developed more and more. The aim of this study was to show the importance of Caldwell-Luc surgical approach in endoscopic sinus surgery era.

**Methods:** Prospective study between 2009 and 2019 in the ENT Department of the Clinical Hospital Sfânta Maria from Bucharest. The inclusion criteria were as follows: adult patients diagnosed clinical and paraclinical with isolated chronic maxillary rhinosinusitis in whom correctly conducted drug treatment failed and, according to current therapeutic guidelines, had indication for surgical treatment. The treatment method consisted of a surgical approach, which was classic or endoscopic, depending on the situation imposed on each patient.

**Results:** The application of the inclusion criteria in the study led in a group of 521 patients, of which 282 men (54.12%) and 239 women (45.87%). Following the accounting of the days of hospitalization and those of medical leave at discharge, a number of days of absenteeism of 13.85 days resulted in the case of patients treated classically and 8.62 days for those treated endoscopically. Also the endoscopic group had a better endoscopic and VAS score postoperatively.

**Conclusions:** Surgical treatment of maxillary sinus can be minimally invasive- endoscopic, extended endoscopic or classical open surgery. Open classic surgical treatment remains the last treatment alternative, with indication for rhinosinusal recurrences or the imminence of complications. Endoscopic surgery is the “gold standard” for chronic maxillary rhinosinusitis.

**Keywords:** Caldwell-Luc, Endoscopic sinus surgery, Maxillary sinus

### INTRODUCTION

For many years, the Caldwell-Luc procedure was the gold standard procedure for chronic maxillary sinusitis. Technological development in recent decades has led to the improvement and spread of endoscopic rhinosinusal surgery techniques as the main treatment of chronic rhinosinusitis. This has been done to the detriment of external approach surgery, which is less and less used.

The use of rhinosinusal endoscopy was initially made only for diagnostic purposes, allowing a good view of the rhinosinus anatomy and pathology present at this level. In

the years '70, we are already talking about functional rhinosinusal endoscopic surgery (or FESS- functional endoscopic sinus surgery- as it was called by the pioneers of these techniques), with a minimally invasive role.<sup>1,2</sup> This surgical approach aimed to restore the permeability of the osteomeatal complex, implicitly the drainage of secretions and sinus ventilation. Because rhinosinusal pathology required a surgical approach that no longer had a functional role, it was concluded that the term endoscopic sinus surgery (ESS) should be introduced. Gradually, the transition was made from ESS to more aggressive, invasive, extended surgical techniques (extended ESS- extended endoscopic sinus surgery),

reaching the transnasal endoscopic approach (TES-transnasal endoscopic surgery) of borderline pathology (skull base, orbit). Levine introduced the concept of endoscopic sinus surgery (MESS), which involves the creation of a single nasosinus cavity when the sinus mucosa is irreversibly compromised.<sup>3</sup> Another concept that is at the opposite end of the MESS is called MIST (Minimally Invasive Sinus Technique). This approach is a component of FESS, minimally invasive, which consists only in opening the ethmoidal bulla.

If initially it was a clear association of terms: endoscopic rhinosinus surgery- functional approach and external surgery- radical approach, nowadays there should be clear indications for each type of surgical procedure.<sup>4</sup>

According to Levine, the indications for surgical treatment of rhinosinusitis are as follows: lack of efficiency of the maximum correctly performed drug treatment; recurrent rhinosinusitis; rhinosinusitis that has developed complications; chronic rhinosinusitis with polyps in the symptomatic stage; isolated or invasive fungal rhinosinusitis.<sup>5</sup>

The aim of this study was to show the importance of Cladwell-Luc surgical approach in endoscopic sinus surgery era.

## METHODS

To compare the two methods of surgical treatment used in chronic rhinosinusitis (endoscopic technique versus open technique- classical), we conducted a prospective study between 2009 and 2019 in the ENT Clinic of the "Sfanta Maria" Hospital from Bucharest.

### Inclusion criteria

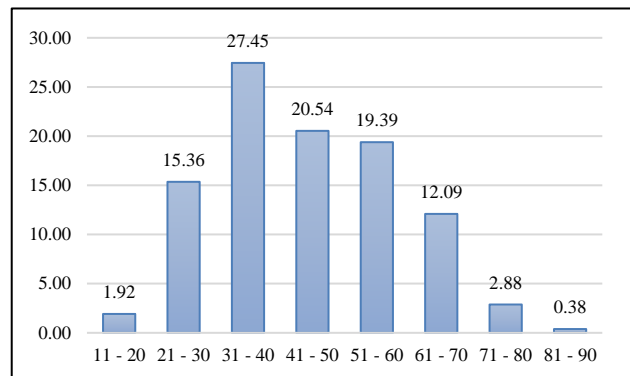
Adult patients diagnosed clinical and paraclinical with isolated chronic maxillary rhinosinusitis in whom correctly conducted drug treatment failed and, according to current therapeutic guidelines, had indication for surgical treatment.

The treatment method consisted of a surgical approach, which was classic or endoscopic, depending on the situation imposed on each patient. Patients were evaluated pre- and postoperative (PO) at 1, 3, 6 and 12 months. To compare the two groups we chose the following criteria: intra/post-operative accidents/incidents; objective local changes- endoscopic score; Subjective changes- VAS score; social reintegration (absenteeism); recurrences that required reinterventions during the monitoring period.

## RESULTS

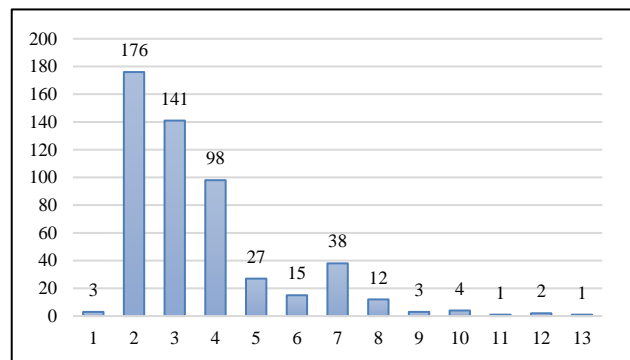
The application of the inclusion criteria in the study led in a group of 521 patients, of which 282 men (54.12%) and 239 women (45.87%). The distribution of patients

according to the age criteria is an important factor that can influence the evolution and postoperative results.<sup>6,7</sup> The age of the patients included in the study ranged from 18 years to 82 years (Figure 1), with a mean of 44.2 years.



**Figure 1: Percentage distribution of the group of patients by decades of age.**

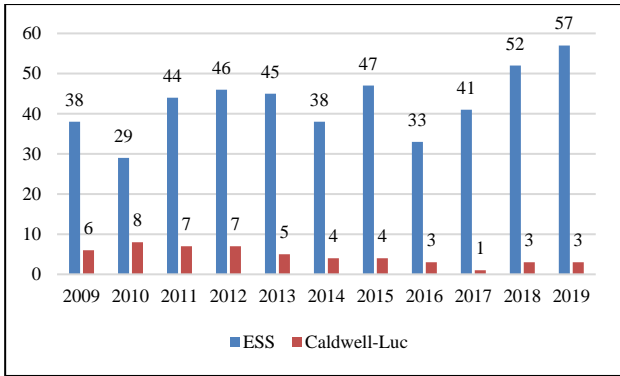
The number of days of hospitalization is an important criteria for monitoring the effectiveness of a medical act, both in terms of assessing the quality of life of patients and the control of medical and financial resources involved.<sup>8</sup> From this perspective, it was considered important to monitor the evolution of this parameter in patients with rhinosinusitis suffering who received surgical treatment. The number of days of hospitalization varied from 1 day to a maximum of 13 days, with an average of 3.58 days (Figure 2). Most patients (176) had 2 days of hospitalization.



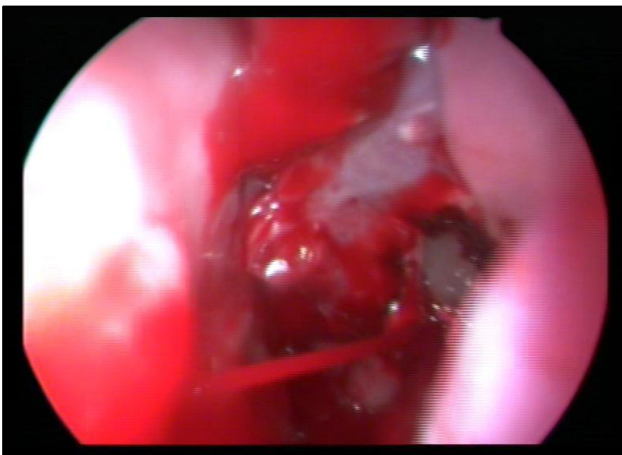
**Figure 2: Number of patients compared to the number of days of hospitalization.**

The study group was split into two subgroups and compared: those who received classical surgery (51 patients) and the others treated by endoscopic surgery (470 patients). The number of Caldwell-Luc procedures decreased over the years, more than half, while the endoscopic sinus surgery tends to increase (Figure 3).

The most frequent intraoperative complications, in the group of endoscopic approach was significant bleeding (Figure 4) in 14 patients (2.97%).



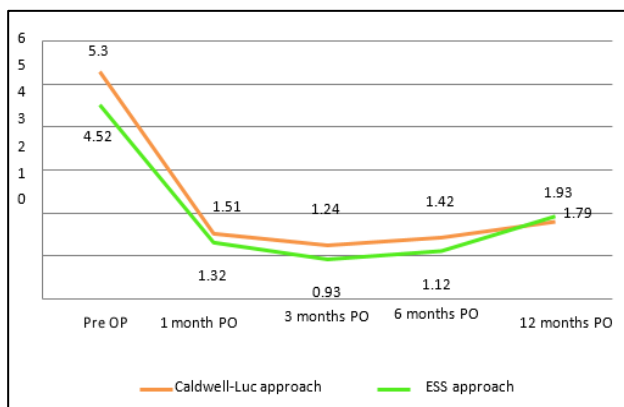
**Figure 3: The number of ESS and Caldwell-Luc surgeries over the year.**



**Figure 4: Bleeding from a branch of the sphenopalatine artery.**

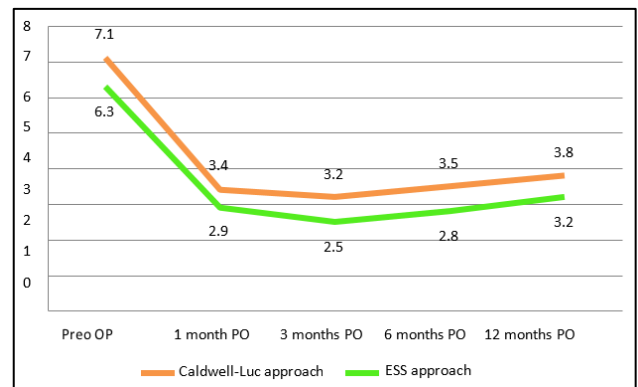
Image from the archive of ENT Clinic, Sfanta Maria Hospital.

Most patients (84.31%) with Caldwell-Luc approach had swelling of the cheek (43) in postoperative days. It should be noted that between the values of endoscopic scores at 12 months of patients treated classically or endoscopically, there is no statistically significant difference ( $p=0.207$ ) but there is a difference between preoperative and 12-month scores ( $p<0.0001$ ), so a statistically significant improvement (Figure 5).



**Figure 5: Comparative evolution of endoscopic score.**

Patients included in the group of those treated classically indicated a severe preoperative impairment of quality of life (7.1 points). In comparison, patients treated endoscopically reported moderate to severe preoperative impairment (6.3 points). Patients experienced a significant improvement in general health postoperatively. Thus, the patients treated classically indicated, at 12 months postoperatively, on an analog-visual scale, an average score of 3.8 points, which represents a statistically significant improvement ( $p<0.0001$ ) (Figure 6). Statistically significant improvement ( $p<0.0001$ ) was also reported in patients treated endoscopically (3.2 points).



**Figure 6: Comparative evolution- VAS score.**

Following the accounting of the days of hospitalization and those of medical leave at discharge, a number of days of absenteeism of 13.85 days resulted in the case of patients treated classically and 8.62 days for those treated endoscopically. Surgical success rate at 12 months PO 100% for Caldwell-Luc approach and 97.23% for those with endoscopic sinus surgery.

## DISCUSSION

The indications for classic rhinosinusal surgical treatment for chronic rhinosinusitis are complications and recurrences after rhinosinusal endoscopic surgery.

The success rate of endoscopic rhinosinusal surgical treatment in patients with isolated chronic maxillary rhinosinusitis was 97.23%. Of the patients treated by the classic surgical approach, none had postoperative recurrence. Data from the literature show a success of endoscopic surgery in the treatment of chronic rhinosinusitis without nasal polyps of 90-93% and for classical surgery of 90%.<sup>9-11</sup>

The study revealed the superiority of endoscopic surgical treatment over conventional treatment. In all these cases, rhinosinusal endoscopic surgery confers advantages over classical surgery, by a better endoscopic score, a bigger improvement in quality of life, a shorter hospitalization time and, subsequently, a faster social reintegration, with the decrease of direct and indirect costs of the health

system. Many authors indicated various intraoperative or postoperative complications like bleeding, facial swelling, lesion of the surrounding structure, but these were more severe in Caldwell-Luc surgical approach than endoscopic sinus surgery.<sup>12</sup>

## CONCLUSION

The management of rhinosinusitis and their complications, taking into account the economic costs they generate, must be guided by medical-surgical therapeutic criteria, depending on the etiology, evolution, complications, degree of discomfort, etc. Failure of medical treatment induces histopathological changes of the mucosa favoring recurrence, recurrences, loco-regional and distant complications, the appearance of invasive fungal forms, etc. All this requires surgical treatment. It can be minimally invasive- endoscopic, extended endoscopic or by classical open surgery. Open classic surgical treatment remains the last treatment alternative, with indication for rhinosinusitis recurrences or the imminence of complications. Endoscopic surgery remains the “gold standard” for chronic maxillary rhinosinusitis.

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