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SURVEILLANCE OF SURGICAL SITE INFECTIONS AT THE RHINO-LARYNGOLOGY DEPARTMENT OF BENI MESSOUS UNIVERSITY HOSPITAL IN ALGIERS IN 2019

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Abstract

The Surveillance of surgical site infections (SSI) is a priority in our facility. In the Rhino-Laryngology department, the SSI incidence has significantly decreased since it joined the active surveillance network in 2006. The Aims are Calculate the incidence of surgical site infections and to identify risk factors for infections and Identify the risk factors associated with the occurrence of SSI. It's a prospective study of surgical site infections (SSI) for analytical purposes. Data collection was carried out from 1st February to the 30th March 2019 with a follow-up up to 30 days. The SSI diagnosis was based on the CDC Atlanta criteria. The analysis of the data was carried out on the EPI-INFO6.04 software. A total of 326 interventions were included. The sex ratio was 0.93, the mean age was 34.9 +/- 18 years. 85.1% had an ASA score = 1, the average length of stay was 4.4 +/- 0.2 days. The percentage of patients reviewed on D30 was 93.5%. Two thirds of the interventions were contaminated clean interventions, and half had an NNIS = 0 score, no emergency intervention was performed, 14 patients contracted an SSI in an average time of 4 +/- 0.4 days, an overall SSI incidence rate of 4.3% (95% CI = [2.1 - 6.5], mean age of infected patients was 44+ /-17.2 years. The incidence rate was 41.7% for the ASA score 2 versus 2.9% for the ASA 1 score, and the incidence of infections was significantly greater when the Altemeier class was contaminated (8.5% versus 2.6%, p <0.01). Laminated on NNIS, the incidence rate varies from 3% for NNIS interventions 0 to 8% for NNIS interventions >1 (p<0.001). In Conclusion, The monitoring of SSI in ORL has highlighted risk factors that should be taken into account in order to improve the management and prevention of risks related to surgical care. However, the improvement of preventive measures must be pursued by influencing extrinsic risk factors. (Justify, Calibri 8)

Index Terms: Surgical Site Infections, The Incidence, Surveillance, Rhino-Laryngology, Risk Factors.

I. INTRODUCTION

The epidemiological surveillance of surgical site infections (SSI) with reporting of results is one of the elements of prevention and evaluation of actions taken; its importance has been demonstrated[1,2,3,4], but it is not sufficient to overcome the lack of resources and rigor in the organization of care in our facility[5,6,7,8,9,10]. Furthermore, other factors reported in the literature must be taken into account in the prevention of SSIs, some of which are related to the general condition of patients (diabetes, obesity, immunosuppression, etc.)[11,12,13,14,15,16], and others are related to a number of proven local risk factors[17]. Algeria does not have a national surveillance network for SSIs, and all data come from surveys conducted in surgical services, with the incidence rate ranging from 3.8% to 17.4% for all types of surgery[18,19,20,21,22,23,24,25]. The SSI surveillance activity at Béni

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Messous University Hospital has been coordinated by the hospital hygiene unit since 2004, and reducing the incidence rate of SSIs is one of the objectives set by our hospital. In the Rhino-Laryngology department, the incidence rate of SSIs has significantly decreased since it joined the active surveillance network in 2006[26].

Objective of our work: Calculate the incidence rate of SSIs, Determine the characteristics of SSIs encountered in the Rhino-Laryngology department, and Identify the risk factors associated with the occurrence of SSIs

II. MATERIALS AND METHODS

This is a prospective cohort study with real-time data collection, and follow-up with telephone reminders was conducted until +30 days postoperatively. All surgical interventions for curative or palliative purposes performed between February 1st and March 30th, 2019 were included, while tonsillectomies, adenoidectomies in children, reductions of nasal fractures, as well as diagnostic procedures (LDS) were excluded. Information was collected by trained investigators in real-time by reviewing patients' medical records, nursing care, operating room registers, anesthesia records, and laboratory results. Data were collected on a standardized form and included:

Patient characteristics: admission, age, sex, intrinsic risk factors (diabetes, obesity, neutropenia, etc.), and extrinsic factors (urinary catheter, peripheral or central vascular catheter, etc.).

Surgical intervention characteristics: ASA score, contamination class, duration of intervention, multiple procedures, NNIS risk index.

SSI characteristics: date of infection, timing of occurrence (during hospitalization or follow-up at day 30), microorganisms, antibiotic treatment, lengthening of stay or rehospitalization, etc. The diagnosis of SSI was established according to the CDC Atlanta criteria, and each SSI was validated by the surgeon. Data entry and analysis were performed using Epi Info 6 software. Appropriate statistical tests based on the nature and size of the variables were calculated, including Pearson's Chi-squared test with a significance level of 5%. For comparing two means, a Student's t-test was used with a 95% confidence interval. Univariate analysis was used to measure the association of different factors with the occurrence of SSI, and this association was measured using relative risk (RR).

III. RESULTS:

Characteristics of the study population

Between February 1st and May 30th, 2019, 326 out of 376 interventions performed during this period (86.7%) were included. The sex ratio was 0.93, with a mean age of 34.9 years ±18. Patients had an ASA score of 1 in 85.1% of cases. The average length of stay was 4.4 days ± 0.2, and the percentage of patients seen in consultation at day +30 was 93.5%.

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Characteristics of the interventions

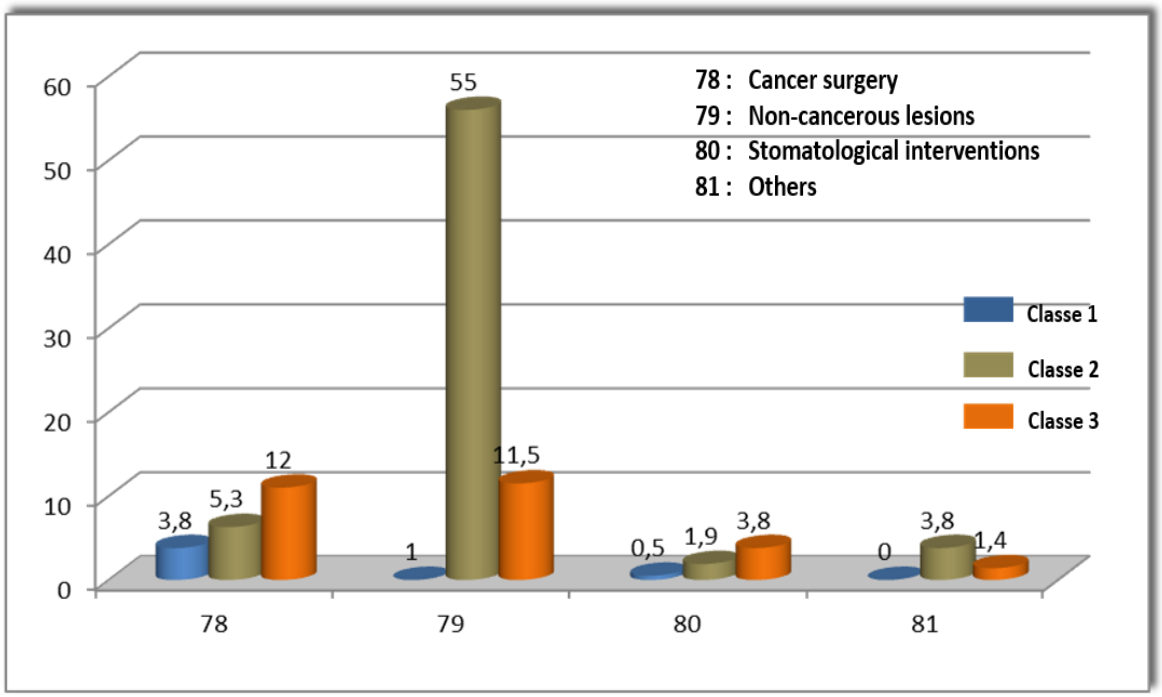

Figure 1: **Distribution of operated patients according to the type of intervention and contamination class, Rhino-Laryngology department, BeniMessous University Hospital, 2019**

Interventions for non-cancerous lesions were the most common procedures in two-thirds of cases, as well as for the clean-contaminated class. The average duration of interventions was 109.1 minutes ± 6.3, with a median of 94 minutes. Half of the patients had an NNIS score of 0, calculated based on the 75th percentile of the distribution of intervention durations, ASA score, and contamination class. The interventions were performed by surgeons with 10 to 15 years of experience in 61.5% of cases.

Description of SSIs:

• Out of 326 operated patients, 14 developed a surgical site infection (SSI), resulting in an incidence rate of 4.2% with a 95% confidence interval [2%, 6.4%]. The infection occurred during the hospital stay for all patients, with an average time to onset of 4 days ± 0.4.

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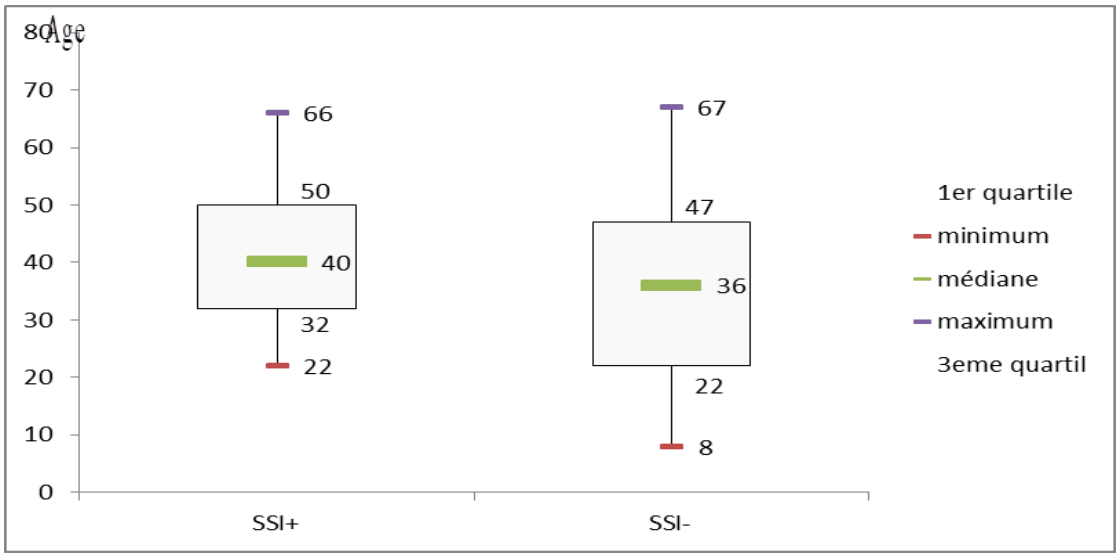

Figure 2: Age of operated patients according to the presence of SSI

The mean age of infected patients was 48 years ± 7 compared to 35.4 years ± 18 for non-infected patients (non-significant difference).

The average length of stay was 10.25 ± 8.4 days for infected patients versus 4.31 ± 3.02 days for non-infected patients (NSD).

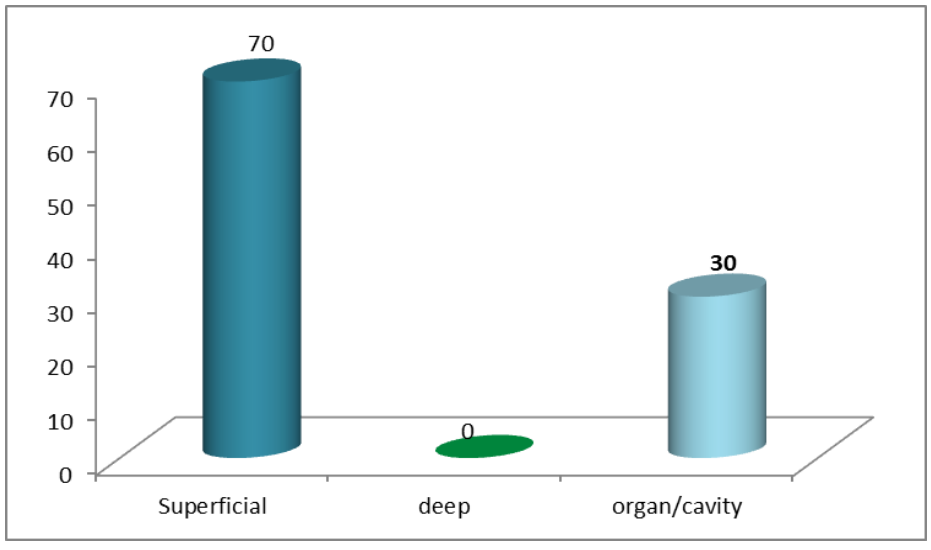

Figure 3: **Distribution of operated patients according to the site of infection**

Superficial infections are predominant, accounting for 70% of cases. All cases of SSI were diagnosed between the first and fifth day, with an average time of 4 ± 0.4 days. The average diagnostic time for superficial infections was 3 ± 0.1 days, and for organ/cavity infections, it was 5 ± 0.8 days (NS).

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Risk factors:

Table 1: Analysis of factors related to the occurrence of SSI in operated patients

	SSI+ (n=14)	SSI- (n=312)	RR*	IC** à 95%	p-value
Age (years) mean ± SD	44±17.1	35.4±18	-	-	NSD
Average length of stay	**10.25±8.44**	**4.31±3.02**	-	-	NSD
Preoperative stay >1 day	85.7%	70.2%	2.32	[0.48-15.3]	NSD
Score ASA ≥ 2 < 2	5 (41.7%) 9 (2.9%)	7 (58.3%) 305 (97.1%)	14.54	[5.7 – 36.8]	<0.001
Altemeier classes Contaminated Clean-contaminated	 7 (16.3%) 7 (2.08%)	 36 (83.7%) 250 (97.9%)	3.29	[1.17 – 9.23]	0.01
Duration of intervention ≥ 75th percentile < 75th percentile	 9 (8.2%) 5 (2.3%)	 100(91.8%) 212 (9.7%)	14.54	[5.7 – 36.8]	0.01
Score NNIS ≥ 1 NNIS = 0	8(21%) 6 (1.8 %)	30 (79%) 282 (94.8%)	10.01	[3.7 – 27.6]	< 0.01
Multiple procedures : Yes No	5 (23.8%) 9 (2.95%)	16 (76.2%) 296(97.05%)	8.07	[2.9-21.94]	<0.001
Operator's years of experience <10 years ≥ 10 years	 4(9.3%) 10(3.5%)	 39(90.7%) 273(96.5%)	2.63	[0.86-8.02]	NSD

*RR= Relative risk **IC= Confidence interval

The incidence rate of SSIs was 8.2% for surgical interventions exceeding the 75th percentile versus 2.3% ($p < 0.01$). It was 41.7% for ASA score ≥ 2 versus 2.9% for ASA score < 2 ($p < 0.001$), as well as for Altemeier class 3 (8.5% versus 2.6%, $p < 0.01$). Stratified by NNIS index, the incidence rate was 21% for NNIS > 1 versus 1.8% for NNIS ≤ 1 interventions ($p < 0.001$), and it was significantly higher for interventions with multiple procedures (23.8% versus 2.95%, $p < 0.001$). The occurrence of SSI tended to be higher in patients operated on by less experienced surgeons (9.3% for those with less than 10 years of experience versus 3.5% for those with >10 years of experience, NS).

IV. DISCUSSION

The rate of SSIs was 4.9% (10/203) in 2006 and 7.3% (16/220) in 2007[19], with a return rate of 19.7% and 32.72%, respectively. In 2019, we recorded an SSI incidence rate of 4.2%, with a significantly improved return rate compared to previous years (93.5% at D+30). This improvement can be attributed to the efforts made by the medical team of both departments, which placed particular emphasis on this parameter to reduce the number of lost to follow-up cases and thereby increase the credibility of the results obtained. However, further efforts are needed to achieve the desired progress in this area.

Age, being an endogenous factor involved in the occurrence of healthcare-associated infections in general, was not found to be significantly associated with the occurrence of SSIs (44 ± 17.1 years versus 35.4 ± 18 years, NS).

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Unlike previous years when SSIs occurred in patients with low infectious risk, with ASA score < 2, Altemeier class ≤ 2, and NNIS = 0, data analysis from SSI surveillance now reveals the usual risk factors. These include patients with ASA score ≥ 2, with the risk of SSI occurrence being 14.54 times higher (95% CI [5.7 – 36.8], p < 0.001). Several authors have demonstrated a significant association between the occurrence of an SSI and an ASA score greater than 2[27,28].

Regarding surgical intervention duration, it exceeded the 75th percentile for the intervention in question in 33.3% of cases, and the risk of SSI occurrence was 3.58 times higher (95% CI: [1.23 – 10.43]). Alseny-Gouly C. et *al*.[28] reported a similar risk of 3.2 ([1.9–5.2]; p < 0.001). Patients with a high NNIS score (≥2) had a 10 times higher risk of contracting an SSI compared to patients with NNIS score < 2 (p < 0.001; 95% CI [2.9 – 38]), which is consistent with literature data[29,30,31]. Similarly, for the presence of multiple procedures, the risk was 8.07 times higher (95% CI: [2.9 – 21.94]).

V. CONCLUSION

The risk factors found in this study should be considered to improve the management and prevention of risks associated with care in surgical settings. Close collaboration among various stakeholders (surgeons, epidemiologists, pharmacists, paramedics, and administration) is essential. This collaboration is necessary to leverage the expertise of each party, exchange information, and implement prevention measures by addressing extrinsic risk factors.

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