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3ES JOURNÉES FRANCOPHONES DE LA MUCOVISCIDOSE

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TRAITEMENT CHIRURGICAL DE LA MUCOVISCIDOSE POURQUOI ET COMMENT ?

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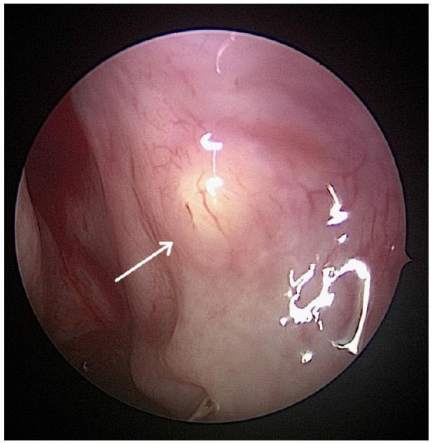
LIRIC
Lille Inflammation Research International Center

Unité des voies aériennes

- **9 pts CRS/CF, 11 pts CRS, 9 sans CRS**

Pvt sécrétions(bactério)/biopsies muqueuses (IHC)



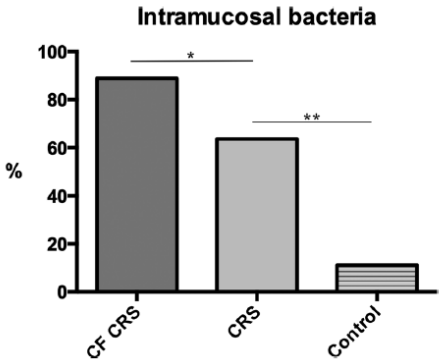


FIGURE 2. The prevalence of intramucosal bacterial microcolonies in the CF-CRS, idiopathic CRS, and healthy control groups. There was a statistically significant difference between controls and idiopathic CRS ($p = 0.02$), and controls and CF-CRS ($p = 0.003$). Prevalence did not significantly differ between idiopathic CRS and CF-CRS. CF = cystic fibrosis; CRS = chronic rhinosinusitis.

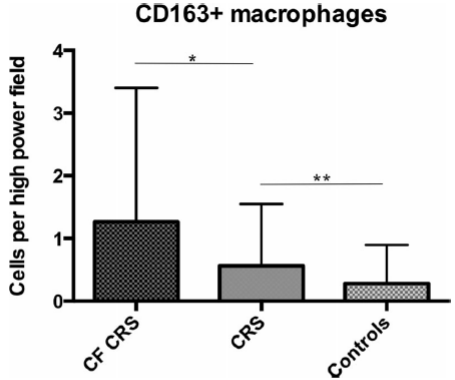


FIGURE 5. Comparison of the number of CD163+ alternatively activated, immunotolerant macrophages in CF-CRS, idiopathic CRS, and healthy control groups. There were significantly more in idiopathic CRS compared to controls ($p = 0.04$), and even more still in CF-CRS when compared to idiopathic CRS ($p = 0.03$). CF = cystic fibrosis; CRS = chronic rhinosinusitis.

Kim RJ, et al. Chronic rhinosinusitis and cystic fibrosis: the interaction between sinus bacteria and mucosal immunity. Int Forum Allergy Rhinol. 2015

Unité des voies aériennes

- **12 pts CF, 6 pts contrôle**

Traceur isotopique sur la muqueuse nasale,

Mesure signal pulmonaire après 8h de décubitus

TABLE 2. Summary statistics for the lung, background, and actual counts (lung-background) by group

	CF patients (n = 12)		Controls (n = 6)		
	Mean ± SD	Median [minimum/maximum]	Mean ± SD	Median [minimum/maximum]	p^a
Lung counts	2.9758 ± 2.3715	2.9543 [0.3928/7.9467]	2.7510 ± 1.2451	2.4935 [1.1515/4.7711]	0.892
Background counts	2.4871 ± 1.9313	2.3088 [0.3730/5.9808]	2.5580 ± 1.1104	2.6756 [0.5504/3.9247]	0.385
Lung-background difference	0.4887 ± 1.3199	0.4913 [−3.0628/1.9660]	0.1931 ± 1.5486	−0.1779 [−1.3785/2.9258]	0.385
p for difference[b]	**0.034**		1.00		

[a]The *p* value is derived from the two-sample Wilcoxon rank sum test between the CF patients and the controls.
[b]The *p* value is based on the Wilcoxon signed rank paired test for the difference between the lung and background counts for each group separately. Bold value is significant.
CF = cystic fibrosis; SD = standard deviation.

Nelson J, et al. Pulmonary aspiration of sinus secretions in patients with cystic fibrosis. Int Forum Allergy Rhinol. 2017

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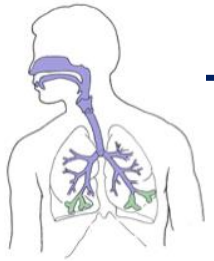


- **16 pts CF**

Bactério sinus et LBA

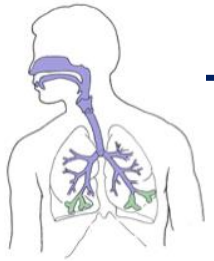
Table 2. Microorganisms in Cultures from Upper and Lower Airways

Bacteria	Upper Airway Cultures	Lower Airway Cultures	*P* Value <.05
S aureus	46	23	.030
Pseudomonas	57	46	.007
S viridans	23	46	.522
S pneumoniae	4	0	[a]
Moraxella	4	0	[a]
Haemophilus	8	4	[a]
Aspergillus niger	0	4	[a]
Aspergillus fumigatus	4	12	[a]
Achromobacter xylosoxidans	0	4	[a]
Scedosporium apiospermum	0	4	[a]
Corynebacterium	4	8	[a]
Candida albicans	0	8	[a]

[a] *P* value = 1.00.

Godoy JM, et al. Bacterial pattern in chronic sinusitis and cystic fibrosis. Otolaryngol Head Neck Surg. 2011

Unité des voies aériennes



- **141 pts CF transplantés**

Bactério sinus et LBA avant ET après transplantation

TABLE 4. Correlation between pre-Tx sinus and post-Tx BAL cultures

	Pre-Tx sinus (n)	Post-Tx BAL (n)	*p* value
Pseudomonas	21	19 of 21	0.003[a]
MRSA	10	7 of 10	0.013[a]
Burkholderia	3	3 of 3	0.001[a]
Achromobacter	1	0 of 1	0.696
Stenotrophomas	1	0 of 1	0.548
Fungus	4	3 of 4	0.650

[a]Statistically significant ($p < 0.05$).
BAL = bronchoalveolar lavage; MRSA = methicillin-resistant *Staphylococcus aureus*; Tx = transplant.

TABLE 5. Correlation between post-Tx sinus and Post-Tx BAL cultures

	Post-Tx sinus (n)	Post-Tx BAL (n)	*p* value
Pseudomonas	24	19 of 24	0.031[a]
MRSA	10	7 of 10	0.014[a]
Burkholderia	3	3 of 3	0.001[a]
Achromobacter	2	0 of 2	0.722
Stenotrophomas	1	0 of 1	0.142
Fungus	4	3 of 4	0.458

[a]Statistically significant ($p < 0.05$).
BAL = bronchoalveolar lavage; MRSA = methicillin-resistant *Staphylococcus aureus*; Tx = transplant.

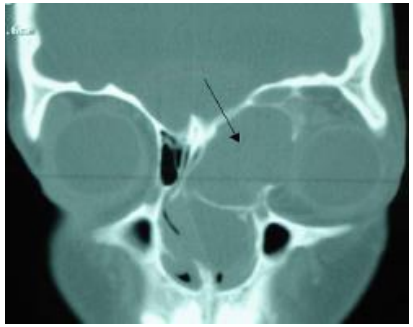
Choi KJ, et al. Correlation between sinus and lung cultures in lung transplant patients with cystic fibrosis. Int Forum Allergy Rhinol. 2017

Indications de la chirurgie

- **En situation d'échec du traitement médical de la RSC**

- **En cas de complications locales**

  Ex: mucocèles (16,4% dans CF)



Di Cicco M, et al. Paranasal mucoceles in children with cystic fibrosis. Int J Pediatr Otorhinolaryngol. 2005

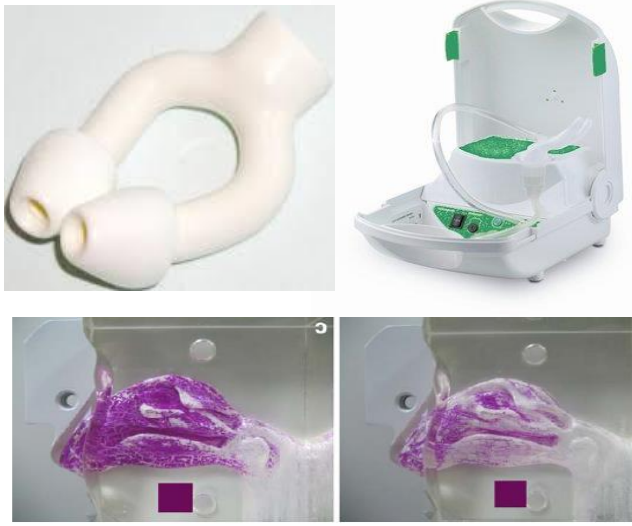
- **Eradication de niches bactériennes naso-sinusiennes +++**

Modalités de la chirurgie

Désobstruction et Drainage

Modalités de la chirurgie

Soins locaux intensifs postopératoires



Irrigation nasale

Aérosolthérapie nasale

Antibiothérapie/cortico thérapie locale

La chirurgie est-elle néfaste sur la croissance du massif facial ?

- **67 pts, âge moyen initial: 3,1 ans**

46pts FESS / 21 pas de chirurgie

Suivi 13,2 ans

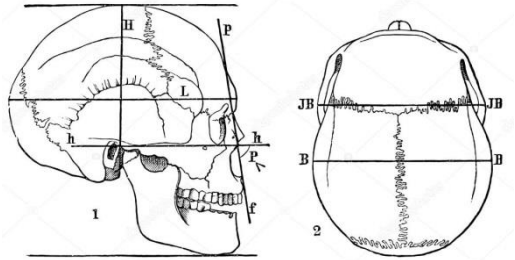


Table 1. Mean *Z* scores for various anthropomorphic craniofacial measurements between patients who did and did not undergo FES surgery

Anthropometric measurement	FES surgery (n = 46)	No FES surgery (n = 21)	Difference (95% CI)	*P*
Nasion-gnathion	−0.09	0.26	−0.35 (−1.04 to 0.33)	0.31
Nasion-stomion	−0.11	0.38	−0.49 (−1.14 to 0.15)	0.13
Nasion-subnasale	−0.07	0.39	−0.45 (−0.95 to 0.05)	0.08
Zygion-zygion	−0.004	−0.31	0.31 (−0.17 to 0.80)	0.20
Endocanthion-endocantion	−0.86	−0.97	0.10 (−0.31 to 0.51)	0.63
Tragus-nasion-right projection	−0.17	−0.19	0.03 (−0.48 to 0.53)	0.92
Tragus-nasion-left projection	−0.33	−0.40	0.06 (−0.44 to 0.57)	0.80
Tragus-subnasale, right projection	.06	−0.06	0.12 (−0.37 to 0.62)	0.62
Tragus-subnasale, left projection	−0.0008	−0.29	0.29 (−0.21 to 0.80)	0.25
Tragus-gnathion, right projection	0.76	0.35	0.41 (−0.20 to 1.02)	0.18
Tragus-gnathion, left projection	0.77	0.45	0.32 (−0.24 to 0.87)	0.26
Tragus-subnasale-tragus	0.84	0.62	0.22 (−0.27 to 0.71)	0.37

FES, Functional endoscopic sinus; *CI*, confidence interval.

Bothwell MR et al. Long-term outcome of facial growth after functional endoscopic sinus surgery. Otolaryngol Head Neck Surg.2002

Résultats bactériologiques de la chirurgie sur les sinus

- **116 pts CF , FESS + ttt locaux intensifs (irrigations/nettoyage/bains colimycine)**

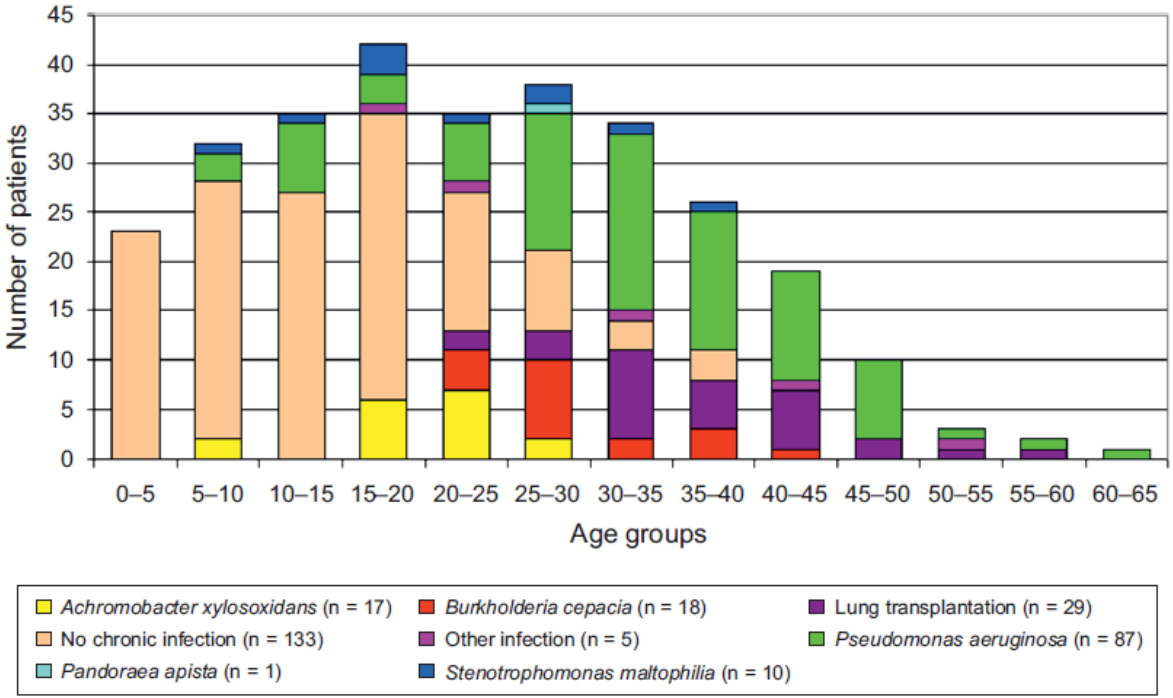
Pvts sinus itératifs

Cultures from the left and right sides of the middle meatus and maxillary sinus perioperative and at follow-up. In conclusion, 21 patients had no re-growth at any time at any sinus during six months of follow-up.

Lung status at surgery	Perioperative	One month	Three months	Six months	Twelve months
LTX	24/24 (100%)	8/24 (33%)	9/20 (45%)	11/22 (50%)	9/20 (45%)
Chronically infected	25/26 (96%)	8/24 (33%)	12/24 (50%)	13/26 (50%)	8/18 (44%)
Intermittently colonised	55/66 (83%)	5/60 (8%)	11/60 (18%)	8/50 (16%)	12/48 (25%)
		19%	31%	32%	24%

Aanaes K, et al. The effect of sinus surgery with intensive follow-up on pathogenic sinus bacteria in patients with cystic fibrosis. Am J Rhinol Allergy. 2013

Résultats bactériologiques de la chirurgie sur le poumon



Aanæs K et al. Bacterial sinusitis can be a focus for initial lung colonisation and chronic lung infection in patients with cystic fibrosis. J Cyst Fibros. 201.

Résultats bactériologiques de la chirurgie sur le poumon

- **106 pts CF ,**

FESS + ttt locaux 6 mois (irrigations/bains colimycine)+ ATBie IV 2 semaines postop
LBA avant chirurgie et à 1 an postopératoire

Lung infection status (as described in subsection 2.2.1) in the CF patients at FESS and a year after FESS and adjuvant therapy

Main lung bacteria	Non-infected		Intermittently colonised		Chronically infected	
	Before FESS	After FESS	Before FESS	After FESS	Before FESS	After FESS
P. aeruginosa			50	31	20	20
A. xylosoxidans			9	6	7	5
B. cepacia complex			2	1	2	3
Total	16	40	61	38	29	28

150%

38%

Aanaes K, et al. Clinical effects of sinus surgery and adjuvant therapy in cystic fibrosis patients - can chronic lung infections be postponed? Rhinology. 2013

Résultats bactériologiques de la chirurgie sur le poumon

- **94 pts CF transplantés ,**

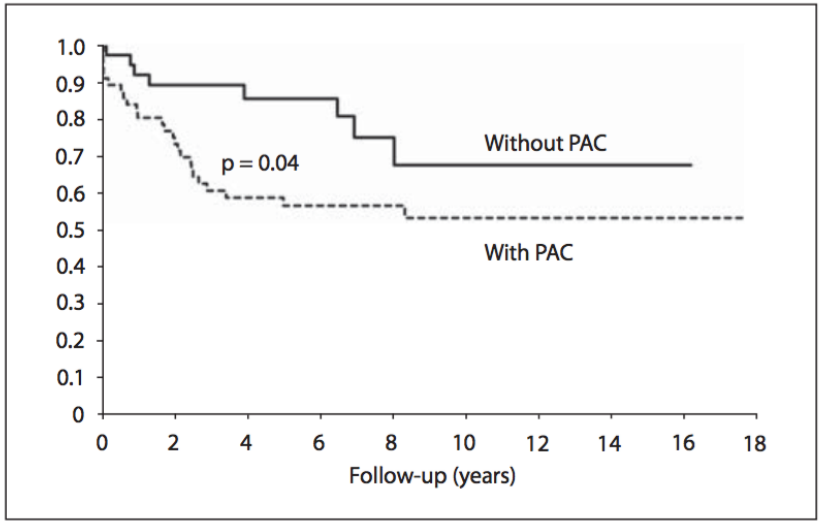
FESS en moyenne 36 jours après transplantation

Lavages nasaux quotidiens

Table 3. Free from PA and BCC after LTx (n = 94)

	After transplantation		Total
	no PA/BCC	PA/BCC	
Before transplantation			
No PA/BCC	15 (16)	0	15 (16)
PA/BCC	23 (24)	56 (60)	79 (84)
Total	38 (40)	56 (60)	

Figures in parentheses are percentages. F test, $p < 0.0001$.



Vital D, et al. Impact of sinus surgery on Pseudomonas Airway colonization and survival in CF lung transplant recipients. Respiration.2013

Indications fonctionnels de la chirurgie sur les sinus

- **Méta-analyse de 882 pts (11 mois à 18 ans) traités par FESS**

- **0,6% de complications sévères**

TABLE IV.
Positive Outcomes of Included Articles.

Article	Patients (n)	Positive Outcome Patients (n)	Positive Outcome (%)
Rosenfeld[10]	18	16	89
Younis and Lazar[15]	500	440	88
Stankiewicz[16]	77	72	93
Lusk and Muntz[1]	24	22	92
Triglia et al.[17]	24	24	100
Haltom and Cannon[5]	44	38	86
Wolf et al.[18]	124	108	87
Bolt et al.[19]	21	16	77
Published data totals	832	736	Average = 88.4
Unpublished data	50	46	92
Total	882	782	88.7

$P = .38$; power = .51.

Hebert RL et al. Meta-analysis of outcomes of pediatric functional endoscopic sinus surgery. Laryngoscope. 1998

Indications fonctionnels de la chirurgie sur les sinus

- **39 pts avec CRS (4 pts CRS+CF) traités par FESS (âge moyen = 10,9)**
- **Glasgow Benefit Inventory for Children (GCBI) à 6 mois post opératoire**

	Non-CF sufferers	CF sufferers	p-value
Overall QoL	99 (95, 102)	90 (88, 105)	0.019
General status	18 (18, 19)	18 (16, 19)	0.164
Medical status	13 (13, 14)	13 (10, 14)	0.494
Psychological domain	35 (34, 37)	35 (30, 37)	0.634
School activity	19 (17, 21)	18 (15, 25)	0.467
Physical activity	13 (12, 13)	11 (10, 13)	**0.040**

Abbreviations: CF: cystic fibrosis, QoL: quality of life.

Fetta M, et al. Functional endoscopic sinus surgery improves the quality of life in children suffering from chronic rhinosinusitis with nasal polyps. Int J Pediatr Otorhinolaryngol. 2017

Indications fonctionnels de la chirurgie sur les sinus

TABLE II.
Summary of Articles Evaluating Quality of Life in CF-CRS Patients.

Validated Instrument	Age Group	Reporter	Design	Validated in CF patient population
Sinonasal-5	2–12	Parent Reported	-7 point response to 5 symptoms -Average score -10 Point Visual analogue scale for overall QOL	No
Sinonasal Outcomes Test-20	≥18	Patient reported	-20 question CRS related questions -0–5 score -Average Magnitude score -Top 5 ranked by reporter	No
Sinonasal Outcomes Test-16	≥18	Patient reported	-4 questions less than SNOT-20 for research purposes -Same scoring as SNOT-20	No
Sinonsal Outcomes Test-22	≥18	Patient reported	-SNOT-22 with additional questions for nasal obstruction and smell disturbance -0–5 score -Average magnitude score -Top 5 are not ranked	No

CF = cystic fibrosis; CRS = chronic rhinosinusitis; QOL = quality of life; SNOT-20 = sinonasal outcome test-20; SNOT-22 = sinonasal outcomes test-22.

Virgin FW. Clinical chronic rhinosinusitis outcomes in pediatric patients with cystic fibrosis. Laryngoscope Investig Otolaryngol. 2017

Indications fonctionnels de la chirurgie sur le poumon

- **181 pts CF (rétrospectif)**

FEV_1 1 an avant et après chirurgie

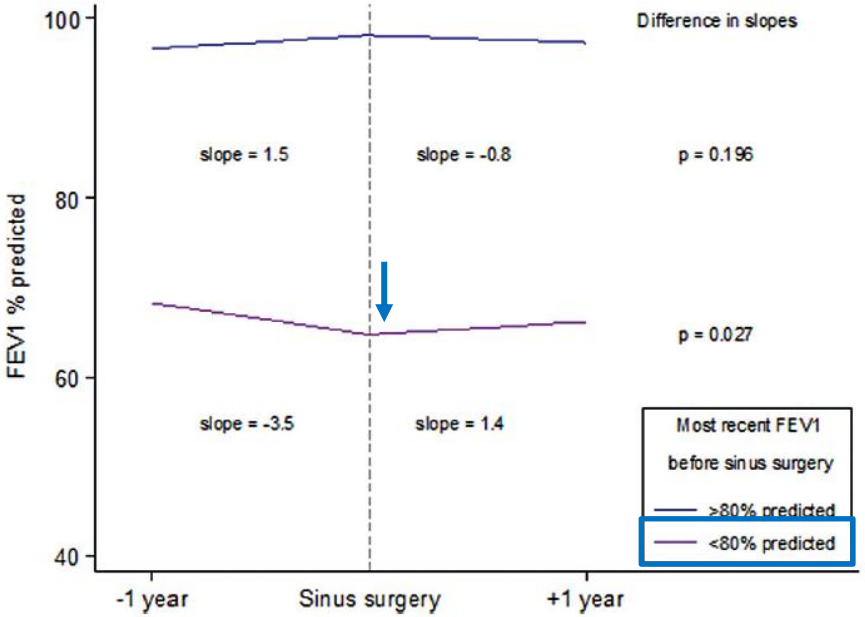


Figure 1. Predicted trajectories of FEV1 based on the mixed-effects regression model. Decline in FEV1 prior to functional endoscopic sinus surgery (FESS) in the moderate/severe lung disease group was reversed after surgery in the moderate/severe lung disease group. FEV1, forced expiratory volume in one second.

Khalfoun S, et al. Improved Lung Function after Sinus Surgery in Cystic Fibrosis Patients with Moderate Obstruction. Otolaryngol Head Neck Surg. 2018

Suites opératoires de la chirurgie

- 213 pts CF / 821 pts non CF
- FESS
- Suivi postopératoire 30 jours

Table 1
Characteristics and 30-day outcomes of children undergoing elective endoscopic sinus surgery, according to history of cystic fibrosis (n = 1034).

Variable	Missing data (n)	Non-CF (n = 821) N (%) or mean (SD)	CF (n = 213) N (%) or mean (SD)	P[a]
Age (years)	0	9.6 (4.6)	10.4 (4.7)	0.025
Male	0	504 (61%)	105 (49%)	0.001
Non-Hispanic White[b]	0	552 (67%)	194 (91%)	<0.001
Weight status	139			<0.001
Normal weight		432 (60%)	160 (79%)	
Overweight		290 (40%)	43 (21%)	
ASA physical classification	0			<0.001
1-2		660 (80%)	70 (33%)	
3-4		161 (20%)	143 (67%)	
Neuromuscular comorbidity	0	19 (2%)	2 (1%)	0.280
Cardiac risk factors present	0	47 (6%)	4 (2%)	0.020
Surgical procedure	0			0.001
Ethmoidectomy		430 (52%)	141 (66%)	
Maxillary antrostomy		368 (45%)	65 (31%)	
Sphenoidotomy		23 (3%)	7 (3%)	
Operative time (m)	0	83 (60)	97 (51)	0.003
Polypectomy performed	0	28 (3%)	11 (5%)	0.231
Surgical outcomes[c]				
Hospital stay >1 day	0	72 (9%)	63 (30%)	<0.001
Readmission	0	33 (4%)	13 (6%)	0.189
Unplanned reoperation	0	11 (1%)	0	0.133

Tumin D, et al. Safety of endoscopic sinus surgery in children with cystic fibrosis. Int J Pediatr Otorhinolaryngol. 2017

Conclusions

Niches bactériennes naso-sinusiennes

CHIRURGIE ET SOINS LOCAUX

Bactéries SINUSIENNES

Bactéries PULMONAIRES

Bénéfice fonctionnel et ventilatoire

Chirurgie post-implantation?

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