MANAGEMENT OF PEDIATRIC DEEP NECK INFECTIONS- A CROSS SECTIONAL RETROSPECTIVE ANALYSIS.

DEPARTMENT OF OTOLARYNGOLOGY-HEAD AND NECK SURGERY | HOSPITAL DE BRAGA

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INTRODUCTION

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DEEP NECK INFECTIONS (DNI's)

- Responsible for significant morbidity in children and healthcare expenditures.
- Few studies exist specifically addressing the clinical and epidemiologic characterization and management of DNI's in the pediatric population.

OBJECTIVE:

- Descriptive study of the management of DNI in our institution
- Demographic characteristics, clinical presentation, diagnostic and therapeutic approaches of DNI in pediatric patients.

METHODS

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Approval by the Ethical Committee of Hospital de Braga

Retrospective Review

Medical records of patients, aged up to 18 years

Admitted for DNI at our department

january 2011- august 2016

DNI were divided into peritonsillar, parapharyngeal and retropharyngeal abscesses/ cellulitis

Patients with other subtypes of DNI were excluded.

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Table 1. Data collected for each patient admitted for DNI, from 2011-2015

- Age at the admission (years)
- Gender
- Hospital Length of stay (HLS) (days)
- HLS superior to 5 days (HLS>5d), (days)
- Seasonal Distribution (Winter, Spring, Summer, Autumn)
- Month at the admission
- Year at the admission
- Type of DNI (peritonsillar, parapharyngeal, retropharyngeal abscess/cellulitis)
- Side of DNI (Left, Right, Bilateral)
- Etiology of the Abscess/cellulitis
- Symptoms at presentation
- Time since the beginning of symptoms until admission (days)
- Tonsillar Hypertrophy (Friedman Grading Scale) at the admission
- History of previous DNI
- Site and side of previous DNI
- History of Recurrent Tonsillitis
- Comorbidities
- Pre- hospital antibiotherapy treatment
- Performance of a Computed Tomography (CT) scan at the admission
- Dimension of the abscess in CT scan (mm) (greater axis)
- Performance of incision and drainage
- Performance of drainage in the operative room
- Laboratorial measurements at admission (Leucocyte / Neutrophil counts , C reactive protein)
- Microbiology analysis of DNI
- Antibiotherapy during hospital stay
- Transference to the hospital of local residency
- Occurrence of complications during hospital stay
- Need for surgical reintervention
- Need for antibiotherapy adjustment during hospital stay
- Need for performance of a CT scan during hospital stay, after admission

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STATISTICAL ANALYSIS

- IBM SPSS Statistics program, 22nd version
- Descriptive statistics: mean ± standard deviation (SD)
- Correlation (Pearson or Spearman correlation tests)
- Associations for categorical variables (Chi-square or Fisher's exact tests)
- Comparison between groups (t-tests or ANOVA and Mann-Whitney or Kruskal Wallis)
- Post-hoc tests
- For significant findings, the effect size is also reported.
- Regression analysis to identify significant predictors of:
  - ✓Occurrence of complications after admission
  - ✓ Hospital length of stay
- Significance is settled for $p<0.05$

RESULTS

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Table 2. Demographic features of pediatric patients admitted for DNI, from 2011-2015 (n=98)

Age (years)	12,07 (±4,75)		
Gender			
Female	53 (54,1%)		
Male	45 (45,9%)		
HLS (days), (n=85) [a]	4,41 (±1,65)		
HLS>5d (days), (n=85) [a]	8 (9,6%)		
Seasonal Distribution			
Winter	23 (23,5%)		
Spring	28 (28,5%)		
Summer	30 (30,6%)		
Autumn	17 (17,3%)		
Month, at the admission	January- 5 (5,1%)	May-11 (11,2%)	September- 8 (8,2%)
	February - 5 (5,1%)	June- 11 (11,2%)	October- 3 (3,1%)
	March- 9 (9,2%)	July-17 (17,3%)	November- 7 (7,1%)
	April- 7 (7,1%)	August- 6 (6,1%)	December- 9 (9,2%)
Year of Hospital Admission			
2011	7 (7,1%)		
2012	11 (11,2%)		
2013	14 (14,3%)		
2014	24 (24,5%)		
2015	31 (31,6%)		
2016	11 (11,2%)		

[a] 15 patients transferred to the hospital of local residency were excluded

sustained increase in the hospital admissions until 2015

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Table 3. Clinical characterization of DNI in pediatric patients admitted, according to DNI subtype, from 2011-2015

Type of DNI	Patients, No. (%) (n=98)	Side (n=98)	Age (n=98)	HLS (n=85*)	HLS>5d (n=85*)	Antibiotics during hospitalization (n=85*)
Peritonsillar Abscess	72,4% (n=71)	Left-42 Right-27 Bilateral-2	12,43 ±4,91	4,43 ± 1,22	49 (15,5%)	AC+ Clindamycin- 50 Clarithromycin + Clindamycin- 1 AC- 3 Ceftriaxone + Clindamycin- 3 Ceftriaxone + Metronidazole- 1
Parapharyngeal Abscess	7,1% (n=7)	Left-2 Right-5 Bilateral- 0	10,80±5,02	4,20 ± 0,84	1 (20%)	AC + Clindamycin- 3 Ceftriaxone + Clindamycin- 2
Retropharyngeal Abscess	4,1% (n=4)	Left-2 Right-1 Bilateral-1	6,00±2,83	5,25± 1,71	3 (75%)	AC + Clindamycin- 2 Ceftriaxone + Clindamycin- 1 Clindamycin- 1
Peritonsillar celullitis	15,3% (n=15)	Left-8 Right-6 Bilateral- 1	10,43±4,47	3,80± 2,51	1 (6,7%)	AC + Clindamycin- 14 AC- 1
Retropharyngeal celullitis	1% (n=1)	Right				AC + Clindamycin
p- value	p<0.05	p>0,05	p>0,05	p<0.05	p<0.05	

[a] 15 patients transferred to the hospital of local residency were excluded

RESULTS

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Table 4. Clinical features of pediatric patients admitted for DNI, from 2011-2015 (n=98)	
History of previous DNI	
No	86 (87,6%)
Yes	12(12,4%) (Peritonsillar celullitis-2; Peritonsillar Abscess – 10)
Side of previous DNI (n=12) (in relation to actual episode)	
Ipsilateral	11 (91,67%)
Contralateral	1 (8,33%)
History of Recurrent Tonsilitis	
Yes	31 (35,2%)
Comorbidities	
Yes	9 (9,3%)
No	89 (90,7%)
Pre-hospital antibiotherapy treatment (n=94)	
Yes	51 (54,3%)
No	43 (45,7%)
Pre-hospital antibioterapy treatment (n=44)	
Amoxicilin	1 (1,2%)
AC	20 (23,5%)
Clarithromycin	1(1,2%)
Penicilin	14 (16,5%)
Ceftriaxone	1 (1,2%)
Azithromycin	2 (5,56%)
cefaclor	1 (1,2%)
Various	4 (11,11%)

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Table 5. Clinical features of pediatric patients admitted for DNI, from 2011-2015 (n=98)	
CT scan at the admission	
Yes	34 (34,7%)
No	64 (65,3%)
Dimension of Abscess in CT scan (mm) (n=18) (greater axis)	19,47(± 8,45)
Incision and drainage (n=81) [b]	
Yes	72(88,9%)
Drainage in the operative room (n=81) [b] Yes	20(24,7%)
Antibiotics during hospitalization (n=85) [a]	
AC	4 (5,7%)
Clarithromycin + Clindamycin	1 (1,4%)
AC + Clindamycin	58 (82,9%)
Ceftriaxone + Clindamycin	6 (8,6%)
Ceftriaxone + Metronidazole	1 (1,4%)

[a] 15 patients transfered to the hospital of local residency were excluded

[b] Patients with peritonsillar cellulitis were excluded

RESULTS- COMPLICATIONS

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Only **2 patients** developed **complications** during hospital stay.

A 4-year-old boy, admitted for a peritonsillar abscess for conservative treatment, initiated dyspnea with stridor in the first day in the ward and a quinsy tonsillectomy was performed.

One patient was readmitted due to persistence of a peritonsillar abscess; It was the case of a 11-year-old boy, submitted to incision and drainage of the abscess, followed by 4days inpatient treatment with amoxicillin-clavulanate plus clindamycin with clinical improvement. He was readmitted 6 days after, due to worsening of the symtoms and completed a 5-day-treatment with ceftriaxone plus metronidazole, with complete resolution.

RESULTS

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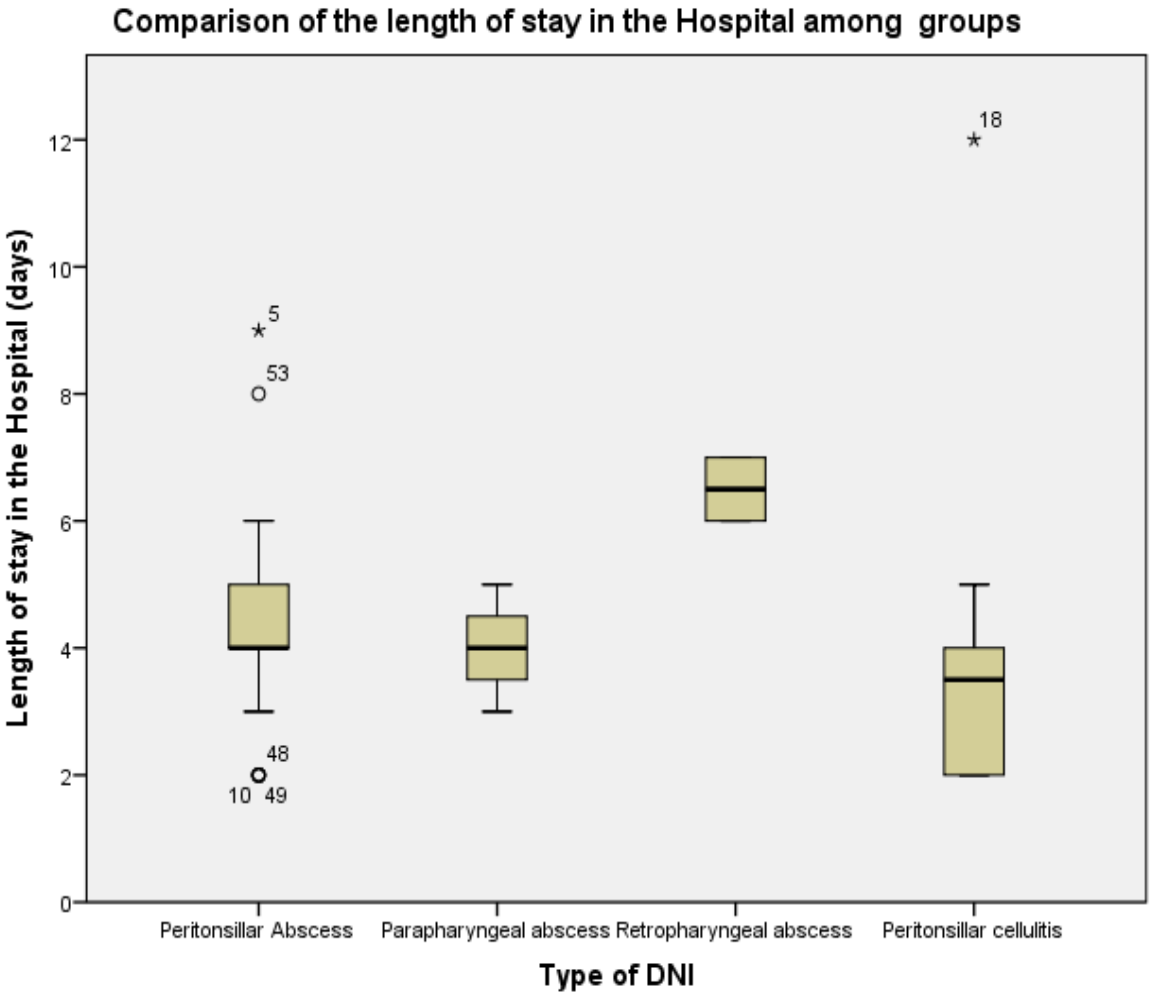
Table 6. Laboratorial and culture analysis of pediatric patients admitted for DNI, from 2011-2015

Laboratorial measurements at admission	
Leucocyte count (x10^9 cells/L) (n=58)	15,3 (±4,3)
Neutrophil count (x10^9 cells/L) (n=57)	11,6 (±4,4)
C reactive protein (mg/dL) (n=40)	71,4 (±49,2)
Microbiology analysis of DNI (n=26)	
Monomicrobial infections	15 (61,5%)
Polymicrobial infections	11 (38,5%)
Microbiology analysis of DNI (n=26) [c]	
Streptococcus pyogenes	7
Streptococcus mitis	7
Staphylococcus aureus	3
Streptococcus gordonii	2
Streptococcus spp	1
Streptococcus intermedius	2
Streptococcus anginosus	3
Streptococcus constellatus	4
Aerococcus spp	1
Streptococcus Paransanguinis	1
Anaerobic Bacteria	
Fusobacterium	3
Veilonella	2
Prevotella melaninogenica	3
Peptostreptococcus asaccharolyticus	3
Clostridium clostridioforme	1

[c] The total percentage is superior to 100% due to polymicrobial infections

RESULTS- Hospital Length of Stay (HLS)



Comparison between categorical variables ***(Kruskal walis)***

Patients with **retropharyngeal abscess** (5,25± 1,71) presented the highest HLS

DNI ($\chi 2$ (3)=10,34, p=0,016)

Mann Whitney test for all pair of groups

≠**Peritonsillar** and **retropharyngeal** abscesses (Z(U)=5,00; p=0,017)

≠ **Peritonsillar** abscess and cellulitis (Z(U)=215,50; p=0,022)

≠ **Retropharyngeal** abscess and **peritonsillar** cellulitis (Z(U)=2,00; p=0,025)

RESULTS- Hospital Length of Stay (HLS)

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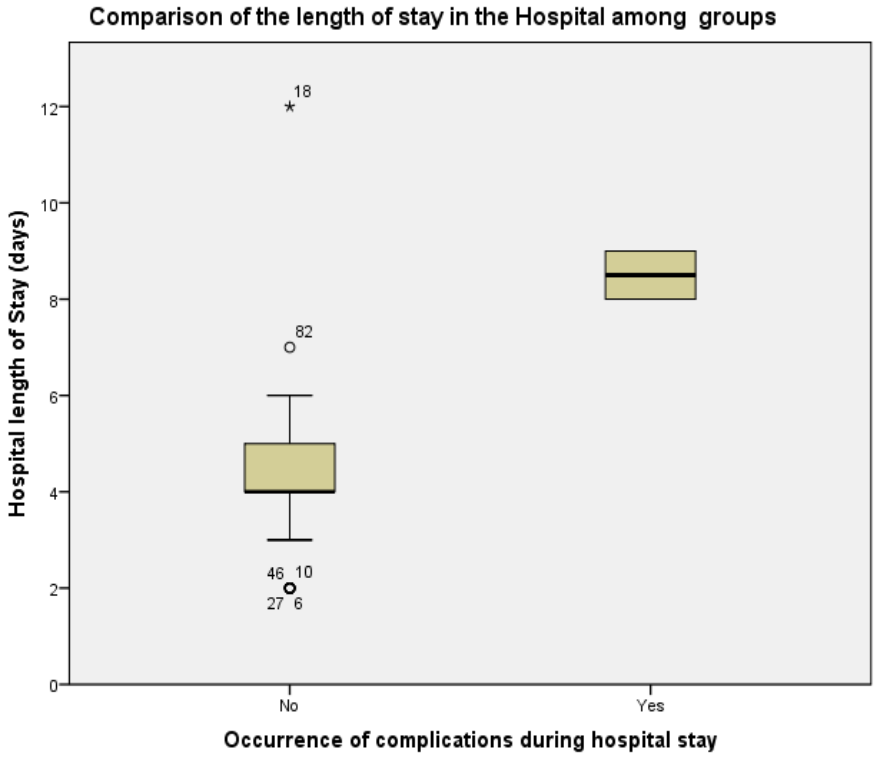
Table 7- Comparison of the HLS among groups, in days. (n=70)

Occurrence of complications		
Yes	8,50 ± 0,71	p<0.05
No	3,81 ± 1,69	

[a] 15 patients transferred to another hospital were excluded



The HLS was positively associated with the occurrence of complications during the hospital stay (p<0,05).
All the patients that presented complications also displayed a HLS>5d.
(Z(U)=2,00; p=0,015).

RESULTS- Hospital Length of Stay (HLS)

The HLS has **fair-moderate positive CORRELATION** with the **DIMENSION OF THE ABSCESS IN THE CT** scan at the admission

(r= 0,52, p<0,05, n=16)

NOTE:

There were **no differences** in the LHS between the patients submitted to **drainage of abscess** and the patients submitted to **medical treatment** alone (p>,0,05).

RESULTS- DIMENSION OF THE ABSCESS

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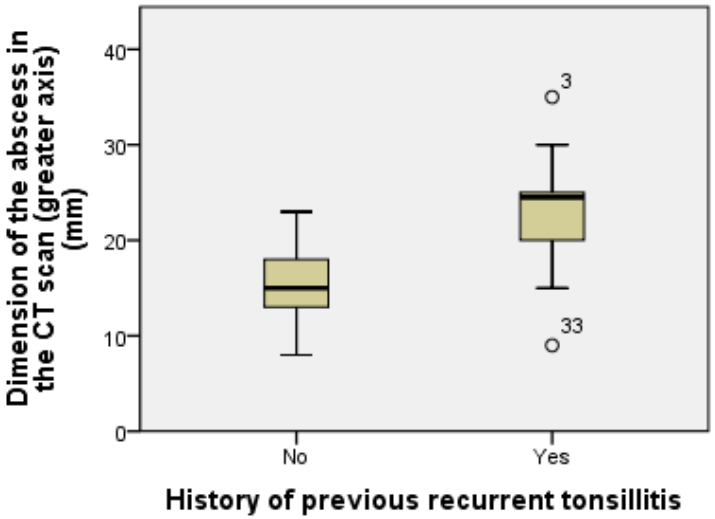
Table 8. Comparison of the Dimension of the abscess in the CT scan at the admission among groups

History of previous recurrent tonsillitis	**Dimension of the abscess in the CT scan** (greater axis) (mm)	*P* value
Yes	22,80 (± 7,33)	0,047
No	15,33 (± 5,16)	
Drainage of the abscess at the admission		
Yes	22,42 (± 6,78)	0,018
No	12,75 (± 3,69)	



The group with **RECURRENT TONSILLITIS** presented larger abscesses in the CT scan (p<0,05).

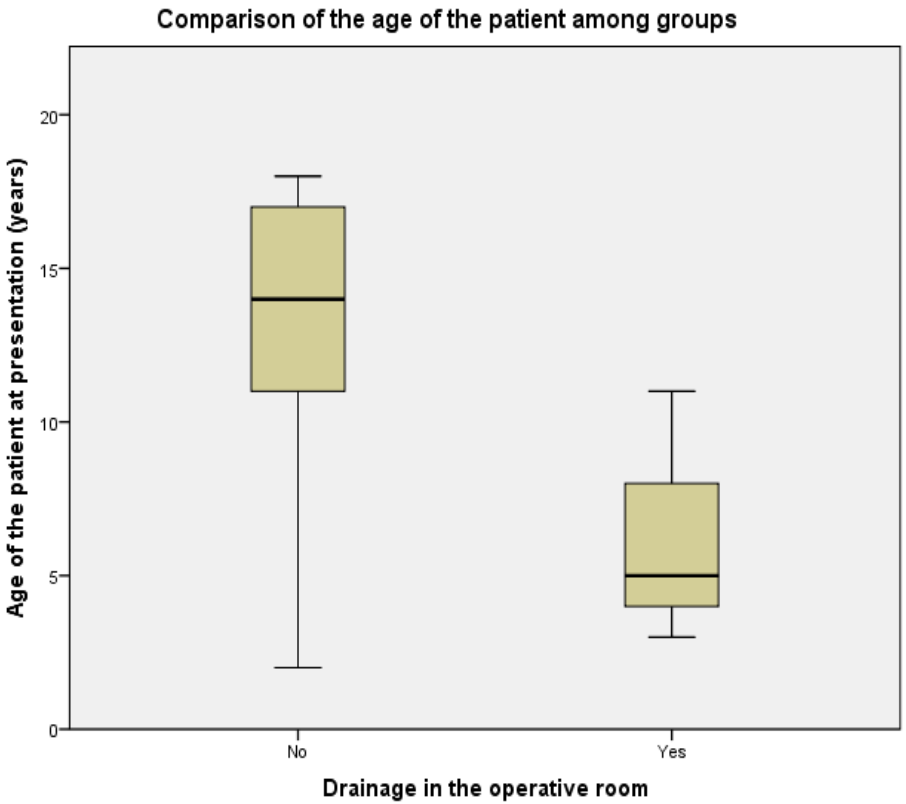
The **GROUP SUBMITTED TO DRAINAGE** of abscess at the admission presented larger abscesses in the CT at admission (p<0,05).

RESULTS

Age

•There were no differences between DNI subtypes (p>0,05)

•As expected, age of the patient at presentation was statistically significantly lower in the group patients **submitted to drainage** of the abscess in the **operative room** (Z(U)=94,0; p<0,001)



RESULTS- REGRESSION ANALYSIS

For the purpose of this study, **NO significant regression models** were obtained where

✓Type of DNI

✓Age

✓Gender

✓Time since the beginning of symptoms until admission

✓Dimension of the abscess in CT scan (mm) (greater axis)

✓Performance of incision and drainage

were predictive variables for

✓**Occurrence of complications after admission**

✓ **Hospital length of stay**

DISCUSSION

•Few studies exist specifically addressing the **INCIDENCE OF DNI** in the **pediatric population**.

•A decrease in the incidence has been previously observed

(improvements in antibiotics + better access to healthcare system)

•Although **recent reports** have documented an **INCREASE** in this incidence.

•This study revealed a **SUSTAINED INCREASE** in the hospital admissions due to DNI in the pediatric age, **since 2011**

•Since 2012 a **specific protocol** for in-patient treatment of peritonsillar abscess has been instituted
>>leading to greater admissions of these cases.

DISCUSSION

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There is **NO ESTABLISHED GOLDSTANDARD** treatment of DNI regarding :

>> indications of **surgical intervention**, **empirical choice** and **duration of antibiotic therapy.**

IN OUR HOSPITAL:

>>Needle aspiration is performed in all patients in order to diagnose the DNI and followed, if positive for purulent exsudate, by **INCISION and DRAINAGE** procedures.

>> intravenous **Amoxicillin clavulanate + clindamycin** is our initial empiric antibiotic therapy of choice

>> Association of **corticosteroids** is the rule

>> **5 days** is the optimal duration of treatment (although **earlier discharge is common**)

The **INCISION and DRAINAGE** approach is also commonly applied in the **United Kingdom** and **Taiwan** for peritonsillar abscess.

•Mehanna HM, Bahnasawi LA, White A. National audit of the management of peritonsillar abscess. Postgrad Med J 2002;78:545–548

•Wang YP, Wang MC, Lin HC, Chou P. The impact of prior tonsillitis and treatment modality on the recurrence of peritonsillar abscess: a nationwide cohort study.PLoS One.2014; 9(10): e109887.

In this study, **NO life-threatening complications** were observed.

DISCUSSION

LIMITATIONS

- Retrospective design
- Small sample size
- Reflects the experience of single medical center
- Empirical antimicrobial coverage may have affected microbiologic findings
- No cost-benefit analysis (CT performance, antibiotics choice)

ADVANTAGES

- Analysis of current management of pediatric DNI
- Evaluation of the efficacy of a specific protocol
- Low morbidity and rate of recurrence

CONCLUSION

•Prompt recognition and initiation of therapy is important to **avoid serious complications**.

•**Surgical incision and drainage** followed by intravenous **antibiotic** and **steroids** proved to be successfull with low morbidity related to surgical approach.

•However, in selected cases, **medical therapy** may be an **alternative** to surgical management in uncomplicated DNI.

•**Future research** is crucial to determine appropriate **guidelines** to select the best therapeutic approach considering clinical, radiologic and laboratorial findings.

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THANK YOU • GRACIAS • OBRIGADA

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