

Pratique Clinique et Investigation

Diagnosis and Management of Nosocomial Sinusitis in Critical Care Units: Review of Literature

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ABSTRACT

Introduction: Recognizing and diagnosing sinusitis in critical care units is difficult as the patient is usually on mechanical ventilator as well as the classic signs and symptoms of acute or chronic nasal sinusitis cannot be validated from the patient.

Aim: To explore and review the causes, risk factors and management of the nosocomial sinusitis in critical care settings.

Methods: A brief review of literature on diagnosing and managing nosocomial sinusitis is discussed in this study.

Findings: In this article, we illustrated some previous studies who mentioned nosocomial sinusitis that led to inducing fever of unknown causes.

Conclusion: Occurrence of sinusitis in critical care settings with fever requested to be recognized very early in ICU patients who are susceptible to and more prone ventilator-associated pneumonia and sepsis.

Recommendation: Early identification of the sinusitis along with culture sensitivity-based antibiotics should be the standard management protocol in all such cases.

Keywords: *Diagnosis; Management; Nosocomial sinusitis; Critical care; Fever*

INTRODUCTION

Nasal sinusitis is defined as an inflammation of nasal mucosa that lined one or more sinuses [1]. The causes of incidence of nasal sinusitis include thick viscosity of mucous, or acquired from viral, bacterial, fungal or infection, allergy, chemical or inhaled toxic materials, septal deviation, neoplastic and trauma. Recognizing and diagnosing nosocomial sinusitis in critical care setting is difficult as the patient is usually connected to endotracheal tube. The traditional and classic signs and symptoms of nasal sinusitis cannot be validated from the patient. The only method and approach to diagnose nasal sinusitis critical care setting is CT scan which illustrates and reveals the hypodensity of lined soft tissue in one or more sinuses of the patient [2,3].

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REVIEW OF LITERATURE

Many previous studies mentioned that nasotracheal intubation [4,5] and utilization of nasogastric tubes [4,6] are the common risk factors for developing acute sinusitis. Other risk factors for nasal sinusitis include nasal colonization with Gram negative enteric bacilli through feeding nasogastric tube route, sedation, and a Glasgow coma score of 7 or less [7].

Acute sinusitis is a principal cause of fever in critical care settings [4] utilization of sinus CT scan in previous studies demonstrates and reveals the presence of air-fluid levels or opacification within the sinuses that emphasize the diagnosis and some researchers called that diagnosis radiographic sinusitis [8]. On the other hand, other authors propose the diagnosis of acute nosocomial sinusitis only if they are able to clear the positive micro-organisms on culture of the exudates that are aspirated from one or both maxillary sinuses [5].

Nosocomial sinusitis has been concerned with ventilator-associated pneumonia [9,10]. In one prospective study, their finding revealed that nasal sinusitis potentiates the risk of VAP by 3.8 times [9]. Patients who had nasal sinusitis that caused by infection with *P. aeruginosa*, *A. baumannii* and *S. aureus* were more prone for developing ventilator-associated pneumonia than those who had nasal sinusitis induced by other pathogens. As a result patients who are on nasogastric tube feeding and being kept on ventilator for long period of time may be the risk factors for causing nosocomial sinusitis in mechanically ventilated patients [13]. To recognize and diagnose nosocomial sinusitis, noninvasive and invasive techniques were utilized. Noninvasive techniques involve physical examination, rhinoscopy, radiography and CT scan. The invasive methods involve antral puncture and endoscopic soft tissue culture and confirmed during endoscopic clearance and on tissue culture report.

CT scan of the sinuses was superior to plain films in evaluating pathologic conditions of the sinuses in patients in the ICU [8] and is now considered the imaging modality of choice for the radiologic diagnosis of sinusitis [11]. This procedure implies transportation of critically ill patients to the CT scanner, which places them at additional risk. For this reason, multiple efforts have been made to develop new radiologic diagnostic techniques that can be performed at the bedside. In summary, Rhinoscopy is still a valuable diagnostic tool and should be performed in all the patients who are suspected to have nosocomial sinusitis. Although CT scan is the radiologic procedure of choice for the diagnosis of NS, B-mode USS is a noninvasive, less expensive and reliable diagnostic technique. B-mode US could be used as a first-line diagnostic test in patients who are suspected of having NS, when we want to avoid transportation to the CT scanner.

Management Nosocomial sinusitis in critical care settings is life saving and requires massive treatment [4,8]. Medical treatment of patients may fail frequently due to misdiagnosis and random use of antimicrobial therapy [4]. Following a puncture of the nasal sinus, administration of antibiotic must be initiated if the culture is positive and adequate clinical and radiologic evidence for nosocomial sinusitis. Sinus cultures in nosocomial sinusitis are frequently containing various bacteria [4,5,8,12] and are different than those that are seen in nonhospital-acquired sinusitis [4]. The most common spread organisms are gram-negative bacteria (GNB) (*Acinetobacter spp.*, *P. aeruginosa*, and *E. coli*) and gram-positive cocci (*S. aureus*, coagulase-negative staphylococci, and streptococci spp.) [5,8-11,13,14].

Although various studies revealed low percentages of anaerobic bacteria isolation in patients in the ICU who have nosocomial sinusitis [5,8,10]. Le Moal et al. [15] isolated anaerobes in more than 50% of cases of documented the presence of nosocomial

sinusitis utilizing bacteriologic analysis. Antimicrobials that can be used managing the nosocomial sinusitis include an antipseudomonal β - lactam/ β - lactamase inhibitor combination such as piperacillin/tazobactam, or ticarcillin/clavulanate, a fourth generation cephalosporin such as cefepime, a carbapenem such as imipenem or meropenem, or combination therapy with ceftazidime and vancomycin. Antibiotics should be based on the susceptibility of the bacteria in the antral samples after microbiologic results are obtained. Alterations in the antibiotic treatment plan according to the culture report provide a better outcome [16].

In addition, Ramadan et al. [17] retrospectively investigated 42 patients in the critical care settings who had findings that revealed sinusitis utilizing CT scans and underwent an antral puncture, when the antibiotics were changed, 83% of these patients had release of fever, whereas only 42% of the patients who did not have the antibiotics changed had clinical improvement. Moreover, administration of nasal decongestants, positioning in the semi-recumbent position, and removal of foreign bodies are complementary therapeutic interventions that should be used in all patients who have nosocomial sinusitis. Frequent flushing with saline solution may be enough treatment for cases of non-purulent secretions [8]. If signs of sepsis are present, however, the empirical use of antibiotics is expected, even in the absence of a purulent discharges. Surgical treatment or sinus aspirate is needed in cases of failure of medical treatment [4,7]. If the patient presents with sign of infection are not identified, surgical drainage should be considered early. Supervision and monitoring measures should be carried out to evaluate the effectiveness of prescribed treatment of sinusitis.

CONCLUSION

Nosocomial sinusitis in critical care settings needs to be diagnosed early and managed to prevent complications such as ventilator associated pneumonia. As well, high risk patients should be detected and worked up for nosocomial sinusitis. Finally, endoscopic drainage of sinuses in line with culture sensitivity-based antibiotics should be followed in all cases of nosocomial sinusitis.

REFERENCES

1. Fokkens W, Lund V, Mullol J (2007) European position paper on rhinosinusitis and nasal polyps group. European position paper on rhinosinusitis and nasal polyps 2007. *Rhinology Supplement* 20: 1-136.
2. Benninger MS (2008) Rhinosinusitis. In: Gleeson M, Browning GG, Burton MJ, Clarke R (Eds.) *ScottBrown's Otorhinolaryngology, Head and Neck Surgery*. 7th (Edn.) London: Hodder Arnold. 2: 1439-1447.
3. Mackay IS, Lund VJ (2008) Classification and differential diagnosis of rhinosinusitis. In: Gleeson M, Browning GG, Burton MJ, Clarke R (Eds.) *ScottBrown's Otorhinolaryngology, Head and Neck Surgery* 7th (Edn.) London: Hodder Arnold 2: 1439-1447.
4. Kronberg FG, Goodwin Jr. WJ (1985) Sinusitis in intensive care unit patients. *Laryngoscope* 95(8): 936- 938.
5. Michelson A, Schuster B, Kamp HD (1992) Paranasal sinusitis associated with nasotracheal and orotracheal longterm intubation. *Archives of Otolaryngology - Head Neck Surg* 118(9): 937-939.
6. Desmond P, Raman R, Idikula J (1991) Effect of nasogastric tubes on the nose and maxillary sinus. *Critical Care Medicine* 19(4):509-511.

7. Vandebussche T, De Moor S, Bachert C, et al. (2000) Value of antral puncture in the intensive care patient with fever of unknown origin. *Laryngoscope* 110: 1702-1706.
8. Fassoulaki A, Pamouktsoglou P (1989) Prolonged nasotracheal intubation and its association with inflammation of paranasal sinuses. *Anesthesia and Analgesia* 69(1): 50-52.
9. George DL, Falk PS, Umberto MG, et al. (1998) Nosocomial sinusitis in patients in the medical intensive care unit: A prospective epidemiological study. *Clinical Infectious Diseases* 27(3): 463-470.
10. Holzapfel L, Chevret S, Madinier G, et al. (1993) Influence of long-term orotracheal intubation on nosocomial maxillary sinusitis and pneumonia: Results of a prospective, randomized, clinical trial. *Critical Care Medicine* 21(8): 1132-1138.
11. Rouby JJ, Laurent P, Gosnach M, et al. (1994) Risk factors and clinical relevance of nosocomial maxillary sinusitis in the critically ill. *American Journal of Respiratory and Critical Care Medicine* 150(3): 776-783.
12. Zinreich SJ (1997) Rhinosinusitis: Radiologic diagnosis. *Otolaryngology Head Neck Surgery* 117: S27-34.
13. Bert F, Lambert-Zechovsky N (1996) Pathogens responsible for concurrent sinusitis and pneumonia in intensive care unit patients. *Infection* 24(1): 52-53.
14. Casiano RR, Cohn S, Villasuso III E, et al. (2001) Comparison of antral tap with endoscopically directed nasal culture. *Laryngoscope* 111(8): 1333-1337.
15. Kountakis SE, Skoulas IG (2001) Middle meatal vs. antral lavage cultures in intensive care unit patients. *Otolaryngology Head Neck Surg* 126(4): 377-381.
16. Le Moal G, Lemerre D, Grollier G, et al. (1999) Nosocomial sinusitis with isolation of anaerobic bacteria in ICU patients. *Intensive Care Medicine* 25(10): 1066-1071.
17. Ramadan HH, Owens RM, Tiu C, et al. (1998) Role of antral puncture in the treatment of sinusitis in the intensive care unit. *Otolaryngology Head Neck Surg* 119(4): 381-384.