

Current Understanding On The Manifestations Of Cancrum Oris- A Review

Reethega.L¹, Dhanraj Ganapathy², Revathi Duraisamy³, Ashok.Velayudhan⁴

¹Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS) Saveetha University, Chennai, TamilNadu India- 600077 Email: 151701042.sdc@saveetha.com

²Professor and Head, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai – TamilNadu India – 600077 Email:dhanraj@saveetha.com

³Assistant Professor, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai – TamilNadu India – 600077 Email ID:revathid.sdc@saveetha.com

⁴Professor & Head (Academics) Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai – TamilNadu India - 600077

ABSTRACT

Cancrumoris is an acute gangrenous stomatitis of oral and paraoral structures in the age groups between 2-16 years particularly in Sub-Saharan Africa with high morbidity and mortality. It is also known as Noma. The underlying causes for noma are primarily poor sanitation and malnutrition. *Fusobacterium necrophorum* and *Prevotella intermedia* are the important bacterial pathogens in this disease process along with one or more bacterial organisms such as *Borrelia* sp., *Staphylococcus aureus* etc. It is often seen as a sequel to Acute Necrotising Ulcerative Gingivitis. The treatment of the bacterial organisms can help arrest the infection but cannot restore already missing or disfigured tissue. 40 articles were chosen from online databases like Pubmed and Google Scholar. The articles are chosen based on their relevance to the topic. Articles from other languages are excluded. Articles which are unrelated to the topic are excluded. The data are extracted from the articles based on their characteristics specified

Noma is a debilitating disease which can result in the loss of daily speech activities. The government and health organizations need to take adequate steps to improve the social living conditions of individuals living in noma susceptible areas. Efforts should be made by medical professionals to provide early intervention and medical care to the patients so that mortality can be reduced and tissue destruction can be minimized.

KEYWORDS: Cancrumoris; gingivitis; noma; bacteria,innovation

INTRODUCTION

Cancrumoris is an acute gangrenous stomatitis of oral and paraoral structures in the age groups between 2-16 years particularly in Sub-Saharan Africa with high morbidity and mortality. It is also known as Noma(1,2). The underlying causes for noma are primarily poor sanitation and malnutrition. *Fusobacteriumnecrophorum* and *Prevotellaintermedia* are the important bacterial pathogens in this disease process along with one or more bacterial organisms such as *Borrelia* sp., *Staphylococcus aureus* etc. It is often seen as a sequel to Acute Necrotising Ulcerative Gingivitis. The treatment of the bacterial organisms can help arrest the infection but cannot restore already missing or disfigured tissue.(3)

Cancrumoris is an infectious disease, which destroys the orofacial tissues and other neighboring structures in its fulminating course. The exact bacteriology is uncertain, although Vincent's spirochaete and fusiform bacillus in symbiosis have been considered to be the actual cause of the condition. Acute necrotising gingivitis and oral herpetic ulcers are considered to be antecedent lesions and *Fusobacteriumnecrophorum* and *Prevotellaintermedia*, alpha- hemolytic streptococci and actinomyces species have been isolated from the lesions. Other organisms, which have been isolated from the lesions, are *Peptostreptococcus micros*, *Veillonellaparvula*, *Staphylococcus aureus*, and *Pseudomonas*. Additional to production of a growth-stimulating factor for *Prevotellaintermedia*, *Fusobacteriumnecrophorum* displays a classic endotoxin, a dermonecrotic toxin, a cytoplasmic toxin, and a hemolysin. The disease usually affects children aged 2-16 years particularly, in Sub-Saharan Africa from 1 to 7 cases /1000 population.

Without appropriate treatment the mortality rate from Noma is 70-90%. Nutritional deficiencies are said to be one of the causative factors. In a study of Nigerian children, significantly reduced plasma concentration of zinc (< 10.8 micro mol/L), retinol (< 1.05 micro mol/L), ascorbate (< 11 micro mol/L), and the essential amino acids, with prominently increased plasma and saliva levels of free cortisol compared with their healthy counterparts was documented(3,4).

Reconstructive procedures are generally required at some subsequent stage and it is usually multi stage procedure. The surgical treatment of the sequelae in the patients affected by cancrumoris is possible, if the surgeon carefully evaluate each patient individually choosing simple, safe, sound and satisfactory technique. There have been reports of one stage reconstruction of defects caused by Noma, which is both cost effective and safe(2). The dental professionals handling this condition should have the awareness of its oral manifestations so as to prevent the onset and the spread of this disease. Our team

has extensive knowledge and research experience that has translate into high quality publications[8–16],[17–22],[23–27]

The main aim of this study is to create awareness about the oral manifestations of Cancrumoris.

MATERIALS AND METHODS

40 articles are chosen from online databases like Pubmed and Google Scholar. The articles are chosen based on their relevance to the topic. Articles from other languages are excluded. Articles which are unrelated to the topic are excluded. The data are extracted from the articles based on their characteristics specified

PATHOGENESIS

The exact etiology of noma is not known but it is believed to be multifactorial in nature. Researchers initially believed that bone exposure caused by acute necrotizing ulcerative gingivitis (ANUG) could act as a passage point for noma. But the present consensus is that ANUG is a precursor for noma. It is suggested that factors such as malnutrition, weakened immune functions and prior viral infection, all worsened by poor oral hygiene could lead to reduction in host resistance and favor the development of oral ulcers. These lesions can serve as entry sites for microorganisms responsible for the disease process. In malnourished subjects, IgA, an important component of the mucosal immune system, is significantly reduced whereas plasma concentration of pro-inflammatory cytokines and C-reactive protein is increased when compared to healthy counterparts. Infections such as AIDS, measles and malaria could also lead to a shift from pro-inflammatory cytokines to anti-inflammatory cytokines. Research has shown that oral epithelial cells and other resident cells secrete several pro-inflammatory cytokines and chemokines in response to bacterial products which in turn can stimulate the expression of matrix metalloproteinase. This matrix metalloproteinase can cause destruction of both hard and soft tissues(5).

MICROBIOLOGY

Noma being an opportunistic infection, the role of specific microorganisms in the pathogenesis has not been explained. This is because of a large range of uncultivable microorganisms, the disease usually develops rapidly in remote geographic areas making it difficult for early microbiological analysis and its prevalence in populations whose normal oral flora is poorly investigated. A number of potential pathogens were found in abundance in the sites of noma which include *Prevotellamelaninogenica*,

Corynebacterium pyogenes, *Fusobacterium nucleatum*, *Bacteroides fragilis*, *Bacillus cereus*, *Prevotella intermedia* and *Fusobacterium necrophorum*. Later studies reported that *Fusobacterium necrophorum*, a predominant animal pathogen to be the most common microorganism isolated from the disease sites in Nigerian children. It was suggested that *Fusobacterium necrophorum* could be a trigger organism for noma. This microorganism produces various toxins and has been associated with necrotizing infections in animals and it may contaminate livestock and potentially infect children. A recent study conducted by Hughye et al. (2013) contradicted the involvement of *Fusobacterium necrophorum* as an etiologic agent. Known periodontal pathogens like *Aggregatibacter actinomycetemcomitans*, *Capnocytophaga*, *Porphyromonas* and *Fusobacteria* were more prevalent in healthy samples compared to those with noma. Studies by Hughye et al. (2013) identified *Prevotella intermedia* and *Peptostreptococcus* to be more clearly associated with noma (6,7).

CLINICAL MANIFESTATIONS

Systemic manifestations of noma include fever, tachycardia, lymphadenopathy, high respiratory rate, anorexia, general edema and ascites. Medical history reveals a parasitic or viral infection (measles, malaria) in the recent past, recurrent fever and diarrhea. Blood examination revealed a low hemoglobin concentration and white blood cell count, elevated erythrocyte sedimentation rate and hypoalbuminemia (8).

ORAL MANIFESTATIONS

The first recognized sign of noma is edema of the cheek, or gingiva or both. A greyish black area appears on the external surface of the cheek opposite to the intraoral lesion within the next few days, which later on becomes a well-defined black necrotic zone. This necrotic zone acquires a cone shape and rapidly sloughs away. Intra-oral manifestations include sequestration of the exposed bone and teeth, halitosis, pseudomembranes, excessive salivation, spontaneous gingival bleeding and loss of tips of interdental gingival papilla (9,10). Sometimes the necrosis is very severe that both maxilla and mandible are completely destroyed extending up till the nose, upper lip, pre-maxilla and the infraorbital margin. Noma can result in trismus, sequestration of jaws, fibrous ankylosis of temporomandibular joint, oro-nasal fistula, damage to permanent tooth bud, early loss of deciduous teeth and hypoplasia of maxilla or mandible. Most of the noma patients have difficulty in mastication because of loss of soft and hard tissue. Severe cosmetic disfigurement can also take place from the resulting scarring and loss of tissue.

DISCUSSION

Cancrum oris, also known as noma used to be a disease of high mortality. In recent times, the mortality rate has gone down due to the usage of modern antibiotics and better nutrition facilities. The oral manifestations can be managed by surgical intervention. Acute noma is managed by blood transfusion, transfusion with intravenous fluid for correction of dehydration and electrolyte imbalances, treatment of associated diseases like malaria and measles, the administration of antibiotics and putting the patient on a high protein diet. The affected area has to be debrided with dilute hydrogen peroxide or Edinburgh university solution of lime (EUSOL) or saline and any remaining tissue slough and sequestrum has to be removed. A course of antibiotics (ampicillin-cloxacillin and metronidazole), multivitamin preparation and antiseptic therapy has to be administered for a week. Patients are advised to rinse their mouth with chlorhexidine gluconate (0.12-0.2%) daily. The patient has to be screened for HIV infection and referred appropriately (11,12)

Surgical correction is initiated after a period of disease quiescence of at least 6 to 18 months. The aim of the surgical procedure is to restore oral speech, oral competence and acceptable aesthetics. Reconstructive surgery in children is delayed till the patient matures because it allows the defect to contract and reduce in size, allows sufficient cooperation postoperatively and ensures adequate tissue for reconstruction. Trismus which most often results from extra-articular ankylosis (fibrosis) is corrected by complete excision of fibrosis followed by physiotherapy. Measures needed to prevent noma include administration of nutritious food, exclusive breast feeding during the first three to six months of life, inculcation of proper oral hygiene practices, immunization against endemic diseases like measles, segregation of animals from human living areas and creating a proper awareness about noma.

CONCLUSION

Noma is a debilitating disease which can result in the loss of daily speech activities. The government and health organizations need to take adequate steps to improve the social living conditions of individuals living in noma susceptible areas. Efforts should be made by medical professionals to provide early intervention and medical care to the patients so that mortality can be reduced and tissue destruction can be minimized.

REFERENCES

1. Aguiar ÁMM, Enwonwu CO, Pires FR. Noma (cancrum oris) associated with oral myiasis in an adult [Internet]. Vol. 9, Oral Diseases. 2003. p. 158–9. Available from: <http://dx.doi.org/10.1034/j.1601->

0825.2003.03942.x

2. Speiser S, Langridge B, Birkl MM, Kubierna H, Rodgers W. Update on Noma: systematic review on classification, outcomes and follow-up of patients undergoing reconstructive surgery after Noma disease. *BMJ Open*. 2021 Aug 5;11(8):e046303.
3. Marck KW. *Noma: The Face of Poverty*. 2003.
4. Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al. *Disease Control Priorities in Developing Countries*. World Bank Publications; 2006.1452 p.
5. Enwonwu CO, Falkler WA, Idigbe EO, Savage KO. Noma (cancrum oris): questions and answers [Internet]. Vol. 5, *Oral Diseases*. 2008. p. 144–9. Available from: <http://dx.doi.org/10.1111/j.1601-0825.1999.tb00080.x>
6. Falkler WA, Enwonwu CO, Idigbe EO. Microbiological understandings and mysteries of noma (cancrum oris) [Internet]. Vol. 5, *Oral Diseases*. 2008. p. 150–5. Available from: <http://dx.doi.org/10.1111/j.1601-0825.1999.tb00081.x>
7. Johnson NW, Scully C, Warnakulasuriya K, Mori M. The horrors of noma (cancrum oris) [Internet]. Vol. 5, *Oral Diseases*. 2008. p. 91–91. Available from: <http://dx.doi.org/10.1111/j.1601-0825.1999.tb00070.x>
8. Coupe MH, Johnson D, Seigne P, Hamlin B. Airway Management in Reconstructive Surgery for Noma (Cancrum Oris) [Internet]. Vol. 117, *Anesthesia & Analgesia*. 2013. p. 211–8. Available from: <http://dx.doi.org/10.1213/ane.0b013e3182908e6f>
9. Falkler WA, Enwonwu CO, Idigbe EO. Isolation of *Fusobacterium necrophorum* from cancrum oris (noma) [Internet]. Vol. 60, *The American Journal of Tropical Medicine and Hygiene*. 1999. p. 150–6. Available from: <http://dx.doi.org/10.4269/ajtmh.1999.60.150>
10. Valadas G, Leal MJ. Cancrum Oris (Noma) in Children [Internet]. Vol. 8, *European Journal of Pediatric Surgery*. 1998. p. 47–51. Available from: <http://dx.doi.org/10.1055/s-2008-1071118>
11. Wilcke BW. Noma [Internet]. *Control of Communicable Diseases*. 2019. Available from: <http://dx.doi.org/10.2105/ccdml.2868.098>

12. Adeola D. Pattern of facial destruction by cancrum-oris (NOMA) in Nigeria: A review of 400 cases [Internet]. Vol. 28, International Journal of Oral and Maxillofacial Surgery. 1999. p. 46. Available from: [http://dx.doi.org/10.1016/s0901-5027\(99\)80795-4](http://dx.doi.org/10.1016/s0901-5027(99)80795-4)
13. Thangavelu L, Nallaswamy V.D, Ezhilarasan D, Flipped classroom teaching and learning improves dental students performance in pharmacology, International Journal of Dentistry and Oral Science Volume 8, Issue 1, Pages 1392 - 1394 January 2021.
14. Lakshmi, T, Medicinal value and oral health aspects of acacia catechu-an update, International Journal of Dentistry and Oral Science Volume 8, Issue 1, Pages 1399 - 1401 January 2021.