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## **Sinistra Buccal Abscess with Reactive Thrombocytosis in a Pediatric Patient (A Case Report)**

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### **Abstract**

*Odontogenic infection is a common polymicrobial infection caused by bacteria, if the focus of infection is left untreated it can cause inflammation which can lead to local and systemic complications. Thrombocytosis in children is generally reactive thrombocytosis or secondary thrombocytosis which is defined as an abnormally high platelet count caused by inflammatory, neoplastic, and infectious diseases where the platelet count can increase  $>700,000/\mu\text{L}$ . Chronic infections that are commonly the main causes often associated with thrombocytosis are abscesses and chronic osteomyelitis. Case report: A 9-year-old male patient was admitted to RSGM Hasanuddin University with complaints of swelling in the left area of the lower jaw extending to the cheek with a size of  $\pm 7 \times 6 \times 2$  cm, diagnosed as buccal abscess sinistra which extends to submandibula sinistra due to pulp gangrene 36. The results of routine blood laboratory tests showed platelets of  $744,000/\mu\text{L}$  suggestive of thrombocytosis. Management to overcome the focus of infection in the form of empirical antibiotic therapy, extra oral drainage incision and extraction of tooth 36 under local anesthesia. Post-action platelet evaluation and treatment of infection did not show an increase in platelets ( $141,000/\mu\text{L}$ ). Management in the form of empirical antibiotic administration, extra oral drainage incision and extraction under local anesthesia is the most appropriate therapeutic option to overcome the focus of infection in pediatric patients who have buccal abscess sinistra with reactive thrombocytosis.*

**Keywords:** *Buccal Abscess, Thrombocytosis, Pediatrics, Incision, Antibiotics, Odontogenic Infection*

### **Introduction**

Orofacial infections are a common health problem in children and are a frequent cause of dental health problems worldwide. Most orofacial infections are thought to be odontogenic in origin. Many of these cases result from untreated dental caries. These infections can progress to cellulitis, abscesses and systemic toxicity if left untreated. Odontogenic infections are polymicrobial, mixed infections (aerobic and anaerobic bacteria) (Al-Malik & Al-Sarheed, 2017; Crescente et al., 2018). In children, the disease can progress rapidly, producing significant systemic symptoms, including fever, dehydration, weakness, discomfort, sweating, weak pulse, leukocytosis, thrombocytosis and sometimes secondary anemia (Doll et al., 2018; Khalid Nawaz, 2016). Thrombocytosis is defined as an elevated platelet count, specifically more than the upper limit of normal or more than  $450 \times 10^9/\text{L}$  (Vora & Lilleyman, 1993; Koprivnikar & Kessler, 2013; Zulkafli et al., 2019; Stockklausner et al., 2021). This condition can be classified as primary thrombocytosis (PT) due to clonal bone marrow disorders such as myeloproliferative neoplasms (MPNs), reactive or secondary thrombocytosis is defined as an abnormally high platelet count in the absence of chronic myeloproliferative disease, resulting from infection, inflammation and bleeding (Kanya et al., 2019; Vora & Lilleyman, 1993). Secondary thrombocytosis is usually identified in routine laboratory testing, as most patients are asymptomatic. Secondary thrombocytosis due to reactive causes is usually reversible. Thrombocytosis is classified into mild ( $450-700 \times 10^9/\text{L}$ ), moderate ( $700-900 \times 10^9/\text{L}$ ), and severe thrombocytosis ( $>900 \times 10^9/\text{L}$ ) (Zulkafli et al., 2019; Yadav et al., 2010; de Lama Caro-Patón et al., 2014). In most children with reactive thrombocytosis, the platelet count is slightly elevated to  $700,000/\mu\text{L}$ . Mild

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thrombocytosis (platelets between 700,000 and 1,000,000/uL) occurs in 6-8% of children with reactive thrombocytosis (Stockklausner et al., 2021; Yadav et al., 2010; Marwaha, 2010). The mechanism of reactive thrombocytosis is unknown. Reactive thrombocytosis is thought to be related to the production of inflammatory cytokines such as interleukins (IL-1 beta, IL-6 and IL-11), tumor necrosis factor (TNF), increased acute phase biomarkers C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) during inflammatory, infectious, neoplastic conditions or in situations of stress and fever (Stockklausner et al., 2021; Tuberculosis, 2020). Thus increasing thrombopoietin production in the liver which triggers megakaryocyte cells to increase platelet count (Deaconu et al., 2014). This becomes noteworthy because based on research, patients with acute infections who experience thrombocytosis have a longer length of stay in the hospital (Schattner et al., 2019).

The treatment of facial abscesses of odontogenic origin in pediatric patients depends on the general condition, disease course status and clinical condition. In treating and managing the infection, it is necessary to take a patient history, make a proper diagnosis, recognize the causative agent, and in this case identify the tooth that is considered to be the main source of infection, it is necessary to perform radiographic examinations such as periapical X-ray and panoramic, extraoral and intraoral clinical examination of the patient (Crescente et al., 2018). Treatment is based on two important principles, namely elimination of the underlying cause, drainage incision and use of oral or parenteral antibiotics. Priority should be given to local treatment in the case of odontogenic infections occurring in children's primary teeth. This consists of extraction of the affected tooth, incision and drainage to remove pus and drainage. Otherwise, local treatment is not done and only antibiotics are given (Crescente et al., 2018). Antibiotics hold the key in the management of foci of infection, antibiotic therapy will be used to treat routine odontogenic infections, empirical antibiotic therapy is recommended as the microbiology of odontogenic infections is well known and usually consistent from patient to patient. The antibiotic of choice for odontogenic infections is still the beta lactam class. Beta lactams are bactericidal, have a good spectrum of action against pathogens responsible for odontogenic infections including streptococci, have low toxicity and are inexpensive. Metronidazole is used when anaerobic bacterial involvement is suspected. It can be used in combination with other antibiotics that kill facultative and aerobic oral pathogens (Ogle, 2017).

### Case report

The 9-year-old male patient and his parents came with complaints of swelling on the left side of the lower jaw extending to the left cheek since  $\pm$  7 days SMRS. Initially the patient felt a toothache in the left lower back tooth  $\pm$  10 days ago. The patient then went to Pattingalloang Health Center Makassar and was advised to seek treatment at RSGMP Unhas.  $\pm$  7 days ago the patient began to feel pain and had difficulty opening his mouth. On their own initiative, 1 day ago the patient's family bought cefadroxil, ibuprofen and dexamethasone at the pharmacy. Because he felt no change and could not endure the pain, the patient then went to Unhas Dental Hospital for further examination. Trismus (+), hoarseness (-), hot potato voice (-), neck stiffness (-), difficulty on swallowing (-), no history of drug and food allergy. History of systemic disease is denied. The patient was not in a state of fever, cold, flu and cough. Vital signs examination revealed BP: -/- mmHg, N: 87x/min, P: 21x/min, Temperature: 37.0°C, SpO2: 99%, VAS: 2/10, with a body weight of 19 kg and a height of 127 cm.

### Extra oral photos before surgery

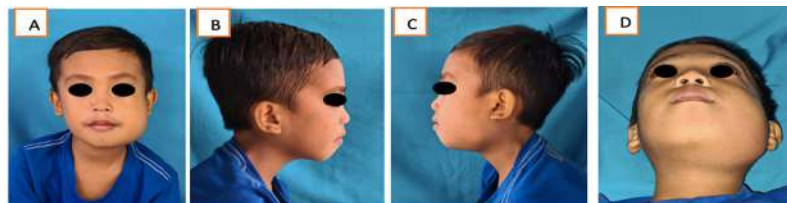
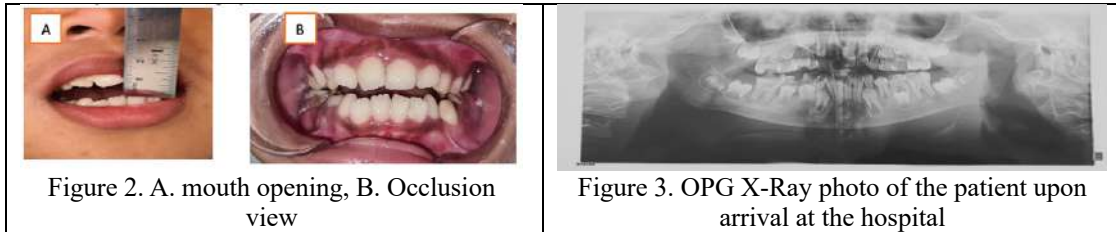


Figure 1. Profile photo A. front profile, B. right profile, C. left profile, D. Submental oblique view

On extra oral examination found (~ Figure 1 A, B, C, D) Asymmetrical face, swelling a/r buccalis region sinistra extending to submandibula sinistra with a size of  $\pm$  7 x 6 x 2 cm, the same color as the surrounding tissue and appears shiny, hard consistency, temperature warmer than the surrounding

tissue, palpation pain (+), fluctuation (+), mouth opening  $\pm$  7 mm, right KGB: not palpable, not painful and left KGB: palpable soft, painful.

**Intra-oral photo before surgery**



In the intra oral examination (~ Figure 2 A, B) found profunda caries perforation of tooth 36, the sinistra buccal vestibule was raised, the gingiva was hyperemic in the tooth 36 region with palpation pain (+), Percussion (+), spontaneous drainage of region 36 (+), Root remains 83,84,85, found calculus with poor oral hygiene status.

Supporting examinations such as OPG X-Ray (~ Figure 3) and routine blood laboratory White Blood Cell (WBC): 30.3 (4.00-11.0)  $10^3/uL$ , Red Blood Cell (RBC): 4.47 (4.50- 5.50)  $10^3/uL$ , Hemoglobin (HGB): 12.0 (13.0-16.0) g/dL, Hematocrit (HCT): 32.3 (40.0-50.0)%, Platelets (PLT): 744 (150-450)  $10^3/uL$ . The diagnosis obtained was an abscess of the sinistra buccal region that extended to the sinistra submandibula accompanied by leukocytosis and thrombocytosis due to pulp gangrene of tooth 36. The treatment plan carried out was to perform extra oral drainage incision accompanied by tooth extraction 36, 75 under general anesthesia and empirical antibiotic therapy.

**Case Management**



Figure 4: Procedure for drainage incision and tooth extraction. A. Incision design and anesthesia before incision, B. Dissection and exploration of the abscess area, C. Extraction of infected tooth

The steps and stages are that the patient is given antibiotics before the extra oral drainage incision is performed under general anesthesia (~ Figure 4 A, B, C). Furthermore, patients who have been under anesthesia are disinfected with povidone iodine 10% in the extra oral and intral oral areas. Marker was made on the area to be incised. Using blade number 11, an incision is made in the submandibular area sinistra, then blunt dissecting and exploration using a hemostat towards the pus bag until the pus comes out. Massaging the swelling area so that all the pus comes out in the area that has been incised, then extracting the cavities that are the source of infection. After all the pus was removed, a rubber drain was installed to maintain drainage in the incised area. Next, a cassette was installed to accommodate the production of pus that came out of the rubber drain. The extra oral drainage incision procedure was completed and the patient was then hospitalized for evaluation of clinical conditions and empirical antibiotic therapy.

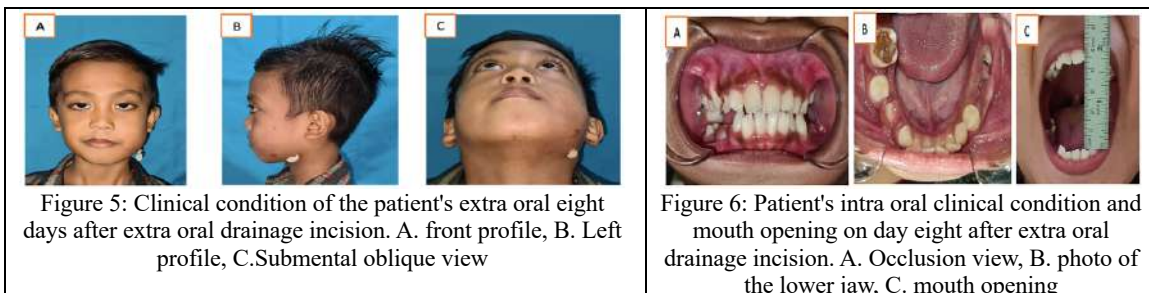


Figure 5: Clinical condition of the patient's extra oral eight days after extra oral drainage incision. A. front profile, B. Left profile, C. Submental oblique view

Figure 6: Patient's intra oral clinical condition and mouth opening on day eight after extra oral drainage incision. A. Occlusion view, B. photo of the lower jaw, C. mouth opening

After eight days of extra oral drainage incision and treatment and the use of parenteral antibiotics, there was an improved clinical response from the patient characterized by reduced swelling of the left

cheek area (~ Figure 5 A, B, C) and improved mouth opening (~ Figure 6 A, B, C) and the results of laboratory examinations showed a decrease in platelet values to  $141 \times 10^3 / \mu\text{L}$ .

## Discussion

Odontogenic infections are infections of the alveolus, jaw, or face that originate from the teeth or from their supporting structures and are one of the most commonly encountered infections. The most common causes of odontogenic infections are dental caries, deep fillings or failed root canal treatment, pericoronitis, and periodontal disease. The infection starts locally around the tooth and may remain localized to the area where it started, or it may spread to adjacent or distant areas.<sup>(16)</sup> This is consistent with the patient's presenting condition, where the patient presented with complaints of swelling of the left mandibular area extending to the left cheek preceded by toothache in the left rear lower tooth. Supported by intra oral physical examination found profunda caries perforation of tooth 36 with pain, fluctuation and hyperemia. Root residue 83,84,85 and poor oral hygiene were also found. Pulp necrosis in teeth due to deep caries allows an avenue for bacteria to enter the periapical tissues. Once these tissues have been inoculated with bacteria and an active infection is established, the infection spreads evenly in all directions, but generally along the line of least resistance (Crescente et al., 2018).

The patient was diagnosed with a sinistra buccal region abscess that extended to the sinistra submandibula. Laboratory results showed an elevated WBC count of  $30.03 \times 10^3 / \mu\text{L}$ . In theory, infection is associated with an increased WBC count which can be widely used as a marker of Serious Bacterial Infection (SBI) in addition to procalcitonin (PCT) (Schattner et al., 2019; Ogle, 2017). The patient also had an elevated platelet count of  $744 \times 10^3 / \mu\text{L}$ . This is thought to be related to the infection and inflammation that occurred in the patient, because in the post-treatment evaluation of the focus of infection, there was a decrease in platelets of  $141 \times 10^3 / \mu\text{L}$ . Infection can also cause a substantial increase in acute phase proteins such as C-reactive Protein (CRP) in plasma concentrations which are mostly liver production. Interleukin-6 plays an important role in the induction of CRP and inflammatory thrombocytosis, along with other inflammation-related cytokines produced mainly by WBCs at inflammatory sites (Kanya et al., 2019; Schattner et al., 2019). In acute inflammation, proinflammatory cytokines produced by activated macrophages are involved in the regulation of inflammatory reactions. There is ample evidence that certain pro-inflammatory cytokines such as IL- $1\beta$ , IL-6, and TNF- $\alpha$  increase prior to the increase in platelet count. Interleukins may be a key mediator of increased thrombopoietin synthesis. Thrombopoietin (Tpo) is a key regulator of platelet production in humans, and is primarily expressed in the liver, and to a lesser extent, kidney, bone marrow and other organs. It acts on hematopoietic stem cells and progenitor cells in platelet formation (Deaconu et al., 2014; Mantadakis et al., 2008; Zhang, & Jianxiong, 2013). So in this case, based on the evaluation of the patient's clinical and laboratory responses, the occurrence of thrombocytosis is concluded to be reactive thrombocytosis caused by an infectious process which results in an increase in pro-inflammatory cytokines which results in an increase in the thrombopoiesis process. There is a case report of reactive thrombocytosis that occurred in a 26-year-old woman with empyema where there was an increase in platelets at the time of initial diagnosis, and using clinical improvement and routine blood as an evaluation where platelets dropped again after treatment of infection with intravenous antibiotics during treatment (Singh, 2007). This is also in line with the study published by Schattner in 2019 regarding thrombocytosis that occurs in acute infections which will spontaneously improve when the infection is resolved (Schattner et al., 2019).

Management of odontogenic infection involves three factors: controlling the source of infection, performing drainage, and mobilizing the immune system (Khalid Nawaz, 2016; Hupp, & Elsevier, 2016). In this case, controlling the source of infection was to extract the tooth with pulp necrosis in the left mandible, and perform an extra oral drainage incision in the left submandibular area. The incision and drainage aimed to decompress the infection, which would provide significant relief for the patient. It will also provide an avenue for irrigation of pus removal. Drainage changes the chemical environment to a more aerobic environment, making it less optimal for more virulent anaerobic bacteria (Khalid Nawaz, 2016). In community outpatient dental practice, antibiotics are administered empirically, as it does not involve taking pus samples for microbial examination (Teoh et al., 2021). The use of antibiotics acts on a broad spectrum, and has minimal toxicity and side effects, affordable

cost is an important consideration in the selection of antibiotic use. In this case, empirical antibiotic therapy began with the administration of ceftriaxone injection 500 mg intravenously every 12 hours and metronidazole drip 250 mg intravenously every 8 hours. Third-generation cephalosporins including ceftriaxone have a broad spectrum and good activity against gram-positive and gram-negative bacterial infections, but are not effective against anaerobic bacteria, therefore a combination with metronidazole is given (Cross et al., 2016). In most studies, it was shown that all anaerobic bacteria were sensitive to metronidazole (Khalid Nawaz, 2016). After the use of antibiotic therapy for 8 (eight) days gave good results in the patient characterized by swelling in the left buccal area reduced, mouth opening in the patient increased  $\pm 4.5$  cm and in routine blood laboratory tests the platelet count dropped to  $141 \times 10^3/\mu\text{L}$ . This suggests that proper management of odontogenic infection can improve infection-related thrombocytosis. Although according to the Scottish Dental Clinical Effectiveness Programme (SDCEP) and the British National Formulary (BNF) penicillin-based antibiotics remain the first line for the treatment of odontogenic infections, the third generation cephalosporin, ceftriaxone may be an option for empirical antibiotics due to its broad spectrum and long half-life, as well as the increasing cases of therapy failure with penicillin (Gallagher & MacDougall, 2018; Shweta & Krishna Prakash, 2013; Jevon et al., 2020).

### Conclusions

A 9-year-old male patient was admitted to Hasanuddin University Dental Hospital with a diagnosis of buccal abscess sinistra which extended to submandibula sinistra due to pulp gangrene 36. The results of routine blood laboratory examination showed platelets  $744 \times 10^3/\mu\text{L}$  suggestive of thrombocytosis. Thrombocytosis improved after controlling the source of infection. Proper management of odontogenic infection is strongly recommended including drainage and administration of broad-spectrum combined empirical antibiotics in pediatric patients with buccal abscess sinistra caused by odontogenic infection that triggers reactive thrombocytosis.

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