International Journal of Research and Reports in Dentistry

3(1): 20-26, 2020; Article no.IJRRD.56025

Dental Implant in a Young with Sickle Cell Disease: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Author LSS wrote the manuscript and performed care. Authors PN and JS performed care. Author FV made the unitary prosthesis and performed care. Author OAN performed implant surgery and reviewed the manuscript. Authors LCM and GFBAC reviewed the manuscript and contributed substantially to the discussion. All authors read and approved the final manuscript.

Article Information

Editor(s):
(1) Dr. M. Jaya Nagendra Krishna, Kamineni Institute of Dental Sciences, India.
Reviewers:
(1) Kavita Nagar, Rajiv Gandhi University of Health Sciences, India.
(2) Renata Poljak-Guberina, University of Split, Croatia.
(3) Ananya Madiyal, A B Shetty Memorial Institute of Dental Sciences, Nitte (deemed to be) University, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/56025

Case Study

Received 10 February 2020
Accepted 15 April 2020
Published 28 April 2020

ABSTRACT

Objective: To report the case of a patient with Sickle cell disease (SCD) subjected to immediate load implant surgery (I) with a history of dental trauma (DT).
Case Report: A 15-year-old male patient attended the CVMT 3 years after DT, reporting aesthetic complaint and discomfort in the tooth 21 (E21). In anamnesis, reported that the adolescent had sickle cell anemia (SCA). Patient regular use of medication and follows up with a hematologist.

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Clinical and radiographic examination, observed a complete permanent dentition, biofilm control, absence of caries and E21 showed tooth remnant, with a corono-radicular fracture and extensive internal resorption. The initial approach was endodontic treatment of E21. After medical release, the extraction was performed, followed by installation of the I with immediate loading. A successful oral rehabilitation with osseiointegration after DT history. The continuity of dental care becomes to keep them free of problems that affect the oral cavity as well as improve their self-esteem.

Discussion: SCA presenting the most severe manifestations of SCD characterized by mutation of hemoglobin. Among the most common oral signs and symptoms are asymptomatic pulp necrosis, neuropathy, and mental nerve mandibular osteomyelitis caused by seizures that may also result in acute blockage of blood vessels in organ pulp. The advantage of the proposed treatment was the bone support maintenance for placing the dental implant and the prosthetic component to be monitored until the greatest age of the patient.

Conclusion: The occurrence of DT in patients with SCA can be a complicating factor for a good prognosis. DT can be minimized through preventive measures such as the use of mouth guards.

Keywords: Sickle cell disease; implant; dental trauma; young.

1. INTRODUCTION

Sickle cell disease (SCD) comprises the group of hereditary hemolytic anemias represented by the structural alteration in the beta-globin chain. The expression SCD defines hemoglobinopathies in which at least one of the mutant hemoglobin is Hb S. The most frequent SCD are S beta-thalassemia, and the heterozygosity pairs Hb SC and Hb SD and sickle cell anemia (SCA). Sickle cell anemia, HbSS, is characterized by culminating in the transformation of biconcave cells into a scythe and repeated submissions of sickling in the microcirculation, whereby the cell loses the ability to return to its original form, causing low oxygenation [1]. Worldwide, the number of live births with SCA is approximately 300.000 children every year, with around 2.000 cases in Brazil. Its incidence varies from 2% to 6% of the global population [2], with most being of Afro descent [3-5].

General clinical manifestations can vary according to the severity of the disease and may require frequent hospitalizations. Vaso-occlusion represents the pathophysiological event that determines the majority of the signs and symptoms present in the patients' clinical picture, such as painful seizures, ulcers of the lower limbs, acute thoracic syndrome (STA), splenic sequestration, priapism, aseptic necrosis of the femur, cerebrovascular accident (CVA), retinopathy, and chronic renal failure [1]. Oral manifestations are not considered pathognomonic signals, but are frequently found in sick patients. Among the most common findings are mucosal pallor, delayed dental eruption, periodontitis (considered uncommon, even in children), changes in the cells of the surface of the tongue, hypomaturation and hypomineralization of enamel and dentin, pulp calcification, malocclusion, aseptic and asymptomatic pulpal necrosis, mental nerve neuropathy, and mandibular osteomyelitis [4,6, 7].

For an appropriate dental treatment, it is indispensable to know the current and past medical history of the sickle cell patient, as well as his or her family history, to determine the degree of systemic impairment. Dental management should be performed during the chronic disease phase to provide the best treatment and thereby maintain the patient's general health status. The dental surgeon should understand the dental implications of SCA for effective and safe treatment [8,9].

In view of this, the objective of this study is to report the case, according Care guideline, of an adolescent with SCA with a history of dental trauma in the upper central incisor who submitted to a dental implant with immediate loading, emphasizing the necessary care throughout the proposed treatment.

2. CASE REPORT

A 15-year-old male patient attended the Dento-Alveolar Trauma Vigilance and Monitoring Center (CVMT), Department of Pediatric Dentistry and Orthodontics, Faculty of Dentistry, Universidade Federal do Rio de Janeiro, with aesthetic complaint due to trauma that occurred three years ago and affected tooth 21 during a collision with a beam during a football match. At the time, the person in charge sought specialized care for the dental treatment, in which the pulp therapy

was started, but it was not finalized. There was a worsening of the condition over the years, especially in the aesthetics, compromising the adolescent's self-esteem.

In the anamnesis, the grandmother reported that the adolescent had SCA, like his brother, with a history of blood transfusions and recurrent hospitalizations due to crises that are characteristic of the condition. The patient has regular follow-up with a hematologist in a specialized center and uses folic acid 5 mg, tramadol hydrochloride 50 mg, hydroxyurea 500 mg, finasteride 5 mg and, in case of pain, ibuprofen 600 mg and dipyrone sodium 500 mg.

During the clinical examination, a coronal fracture was observed with a displacement suggestive of root fracture, open endodontic access, and dark coloration of the crown. After the radiographic examination, the presence of root fracture was verified, as well as advanced internal resorption and apical lesion related to this tooth, thus closing the patient's diagnosis (Figs. 1 and 2).

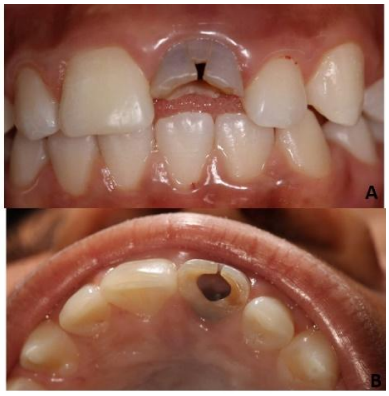

Fig. 1. A) Frontal view; B) occlusal view

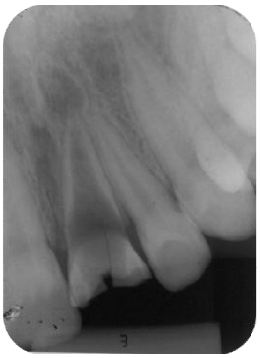

Fig. 2. Initial radiography

After discussing the case with a multidisciplinary dental team (pediatric dentistry, endodontics, and implantology), it was decided that treatment would be the extraction of tooth 21 and implant placement with immediate loading. This treatment was divided into two stages.

Step 1 - Immediate treatment: To eliminate the risk of local infection and perform the maintenance of bone support, the tooth canal was filled with biocompatible slurry (calcium hydroxide, iodoform, and glycerin) without mechanical preparation. The steps of the procedure included infiltration anesthesia in papillary region with 2% lidocaine epinephrine 1:100,000, absolute isolation, and irrigation with sodium hypochlorite (NaOCl) and saline solution. The sealing was performed with Glass Ionomer Cement (Fig. 3).

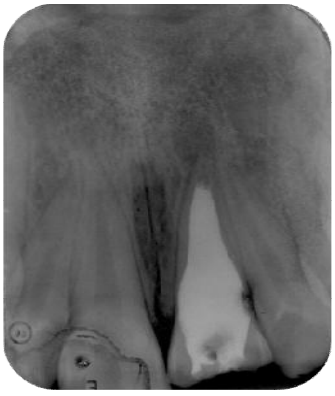

Fig. 3. Periapical radiography with endodontics biocompatible material

The patient's growth was evaluated through hand and wrist radiography to plan the exodontia and immediate dental implant. After the clinical examination and medical release, the procedure was scheduled.

Step 2: Before the surgery, blood count was conducted to evaluate the hematocrit basal day 19.1% and antibiotic prophylaxis amoxicillin 2g an hour before. After anesthesia with 2% mepivacaine, epinephrine 1:100.000, the extraction of tooth 21 was performed, and immediately after, an implant type cone morse 0.38 x 15mm (Strong SW, SIN™ Implant, São Paulo, Brazil) with torque 30N was installed, receiving immediate provisional load.

Periodic revisions were made to follow the osseiointegration of the implant in the region.

There were no complications during the period that might impair the patient's recovery.

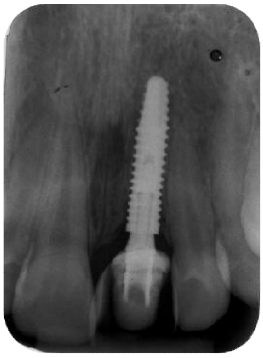

Fig. 4. Periapical radiography 10 months after surgery

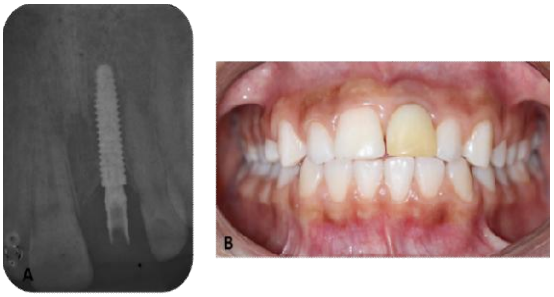

Fig. 5. A) Periapical radiography 18 months after surgery. B) Photography after 18 months

Ten months after surgery, the radiographic examination shows a satisfactory osseiointegration of the implant (Fig. 4). After 18 months, we observed clinically the tissues are within the normal range, and the aesthetic was reestablished (Fig. 5). Regarding adolescent self-esteem after prosthetic rehabilitation and adequate care, the patient reported better well-being. Unfortunately, there has been no change from the provisional to the final prosthesis for financial reasons. Periodic reviews are still underway for oral health control and bone support monitoring.

3. DISCUSSION

Sickle cell anemia is a common genetic disorder, presenting the most severe manifestations of SCD characterized by mutation of hemoglobin A to S (HBSS) [4,10]. This mutation, in cases of absence or decrease of oxygen tension, causes its polymerization, drastically altering the morphology of the red blood cells, which take the shape of a scythe. Sickle red blood cells make blood circulation difficult, causing vasoconstriction and infarction in the affected area [11].

Oral manifestations are not as common as other complications of the disease. Among the most common oral signs and symptoms are asymptomatic pulp necrosis, neuropathy, and mental nerve mandibular osteomyelitis caused by seizures that may also result in acute blockage of blood vessels in organ pulp [11,12]. In our case, the pulp necrosis has occurred due to an enamel and dentin fracture with pulp exposure [13] together with a delay in suitable dental treatment.

The installation of an immediate implant is indicated whenever it contains an intact cavity with soft and healthy tissues, absent from diseases and from all clinical occurrences in which the dental element is affected and the remaining bone leaves circumstances to obtain and consolidate the implant [14,15].

For the installation of the dental implant, the important thing to consider is the biological age and not the chronological age of the patient [15]. In relation to the evaluation of the patient's growth, it was performed through hand and wrist radiography, that is considered the standard and most used method to determine skeletal maturation that may or may not coincide with chronological age [16]. In terms of chronological age, pubertal growth spurt follows a sexual dimorphism, with an average of two years later for male deduction of up to 12 years for boys peaking at 14 [16]. The skeletal maturation stages decisively influence the diagnosis, planning, prognosis, and treatment outcome [15]. Branemark (1996) reported that there is no ideal chronological age for implant placement. The patient should be observed individually, as we did, and the decision should be made to treat or not with osseointegrated implants [17].

Regarding the laboratory tests, the blood test is the test of choice. It evaluates the cellular blood elements qualitatively and quantitatively from the erythrocyte count that will aid in the diagnosis of anemia and polycythemia from hemoglobin and hematocrit determination as basal rates (17-20%), corpuscular volume medium (VCM) (80-98fL), corpuscular hemoglobin mean (MCH) (5-32pg), corpuscular hemoglobin concentration

(MCHC) (32-36 g/dl), and RDW (11.5-14.5%), which will evaluate the erythrocyte structure [11]. In our patient, we observed the baseline hematocrit of 19.1%, which indicated the surgery and other tests were within the reference rates.

Patients with sickle cell disease are considered ASA III. The use of local anesthetics is preferable to general anesthesia due to the reduced risk of decreased oxygenation, anxiety, and pain [12, 18]. In dentistry, one of the main advantages of local anesthesia with vasoconstrictor is to minimize the patient's discomfort during clinical treatment by increasing the life span of the anesthetic drug in the tissue in which it was infiltrated. Then, whenever possible, it is used before any procedure that triggers pain. The most consistent approach would be to use anesthetics with vasoconstrictors in specific and really necessary cases, such as surgical interventions [9]. However, the use of anesthetics with vasoconstrictors is still very controversial [11]. It may or may not compromise circulation and initiate a local infarction due to tissue oxygenation impairment [19]. Faster and more routine procedures in patients with critical sequelae of sickle cell anemia should preferably be performed with local anesthetic without vasoconstrictor. The decision to use it should be made in conjunction with the medical staff accompanying the patient [11,12].

Concerning the medical precautions, antibiotic prophylaxis should precede dental procedures accompanied by bleeding, including coronal polishing and supragingival scaling in people with gingivitis, subgingival scaling, extractions of deciduous and permanent teeth, pulpotomies, pulpectomies, and oral surgeries that cause transient bacteremia. Particularly, patients with sickle cell disease may promote secondary infection, resulting in falciparous seizures. Therefore, antibiotic therapy becomes extremely necessary [11]. According to the literature, children above five years of age should receive amoxicillin (50 mg/kg) orally one hour before procedure (maximum dose of 2 g). Recommendations for extraction and immediate implant placement are teeth with irreversible damage in caries below the gingival margin, endodontic treatment, and root fractures [15]. Therefore, this protocol was done with this patient [11,12].

The application of the immediate installation technique has the benefit of achieving satisfactory results, more accelerated and functional in a predictable therapeutic technique with a high success rate. The use of this technique reduces the number of surgical interventions, reduces the time between tooth extraction and permanent installation of the prosthesis, avoids the process of bone resorption, and preserves the alveolar ridge in terms of proportion, size, and width [13].

One of the limitations to discuss the case report was the low evidence in the current literature consulted. There one case report [20] on the condition (SCA) and therapeutic proposals to perform oral rehabilitation.

A single implant in the anterior maxilla is a common treatment for the replacement of a missing tooth due to trauma [14]. The conservation of alveolar bone may be the most important reason for the use of implants in growing patients and some cases may benefit, stimulating the development of the alveolar process [15]. Finally, the advantage of the proposed treatment was the bone support maintenance for placing the dental implant and the prosthetic component to be monitored until the greatest age of the patient. To maintain the health of these patients, the dentists' knowledge about sickle cell disease is extremely important, demystifying misconceptions and clarifying questions about dental care in patients with the disease. The continuity of dental care becomes important to keep them free of problems that affect the oral cavity as well as improve their self-esteem.

4. CONCLUSION

The occurrence of DT in patients with sickle cell anemia can be a complicating factor for a good prognosis, especially when treatment is sought late. DT can be minimized through preventive measures such as the use of mouth guards. And, in general, patients diagnosed with sickle cell anemia should have a follow-up with the dentist to control the risk of infection, minimizing the worsening of the crises and condition underlying the patient's general condition.

CONSENT

Written consent documented in clinical records has been obtained for publication of clinical images.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

ACKNOWLEDGEMENTS

This study was financed in by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) (finance code 001).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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[Acesso em: 17 abr. 2020]
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Peer-review history:
The peer review history for this paper can be accessed here:
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