Cases Report
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Dental Care for Pediatric Liver Transplantation: A Case Report

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Abstract: Liver transplantation is the treatment of choice for a person with end-stage liver disease. Biliary atresia is the disease with higher prevalence in children. Dental care is indispensable for the receiver of transplantation. That process avoids infection and complications. **Aim:** To report dental management and its relevance to the pediatric liver transplantation program. **Case report:** A five-year boy with BA in the liver transplantation program had the indication of dental care treatment before surgery. Oral foci of infections were seen during the oral examination. Therefore, planned procedures included dental prophylaxis, dental restorations with glass ionomer cement, and dental extractions. In this, to avoid hemorrhagic events, a hemostatic paste composed of two tranexamic acid 250 mg tablets, macerated, and mixed with 1/3 tube of anesthetic with a vasoconstrictor was used. All dental procedures included behavioral management of the child. **Conclusion:** Dental care for children undergoing liver transplantation aims to remove infection foci and guide the parents about the importance of oral hygiene in all stages of the process. Understanding liver disease allows the dentist to choose the ideal dental treatment, in the case of children, behavioral management is indispensable for the success of the treatment.

Key words: Biliary atresia, Liver transplantation, Child. Pediatric Dentistry, Dental care.

Cuidados odontológicos en el trasplante hepático pediátrico: Un reporte de caso

Resumen: El trasplante de hígado es el tratamiento de elección para una persona con enfermedad hepática terminal. La atresia biliar es la enfermedad con mayor prevalencia en niños. El cuidado dental es indispensable para el receptor del trasplante. Ese proceso evita infecciones y complicaciones. **Objetivo:** Informar sobre el tratamiento odontológico y su relevancia en la programación del trasplante hepático pediátrico. **Reporte de caso:** Niño de cinco años, con atresia biliar, en programación para trasplante hepático y con indicación de tratamiento odontológico antes de la cirugía. Durante la exploración bucal se observaron focos infecciosos orales. Así pues, se planificaron procedimientos que incluían profilaxis dental, restauraciones dentales con cemento de ionómero de vidrio y extracciones dentales. Para evitar eventos hemorrágicos en las cirugías, se utilizó una pasta hemostática compuesta por dos tabletas de ácido tranexámico de 250 mg, maceradas y mezcladas con 1/3 de anestésico con un vasoconstrictor. Todos los procedimientos dentales incluyeron el manejo conductual del niño. **Conclusión:** La atención odontológica a los niños sometidos a trasplante hepático tiene como objetivo eliminar los focos de infección y orientar a los padres sobre la importancia de la higiene bucal en todas las fases del proceso. El conocimiento de la enfermedad hepática permite al odontólogo elegir el tratamiento odontológico idóneo y, en el caso de los niños, el manejo comportamental es indispensable para el éxito del tratamiento.

Palabras clave: Atresia Biliar, Trasplante de hígado, Niño, Odontología Pediátrica, Atención Odontológica.

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Cuidados odontológicos no transplante hepático pediátrico: Um relato de caso

Resumo: O transplante de fígado é o tratamento de escolha para uma pessoa com doença hepática em estágio terminal. A atresia biliar é a doença com maior prevalência em crianças. O atendimento odontológico é indispensável para o receptor do transplante. Esse processo evita infecções e complicações. **Objetivo:** Reportar o manejo odontológico e sua relevância na programação para o transplante hepático pediátrico. **Relato de caso:** Um menino de cinco anos, com atresia biliar, em programação para o transplante hepático e com indicação de tratamento odontológico antes da cirurgia. Foram observados focos orais de infecções durante o exame bucal. Dessa forma, foram planejados os procedimentos que incluíram profilaxia dentária, restaurações dentárias com cimento de ionômero de vidro e extrações dentárias. Para evitar eventos hemorrágicos nas cirurgias, foi usada uma pasta hemostática composta de dois comprimidos de ácido tranexâmico de 250 mg, macerados e misturados com 1/3 de anestésico com um vasoconstritor. Todos os procedimentos odontológicos incluíram o manejo comportamental da criança. **Conclusão:** O atendimento odontológico para crianças submetidas ao transplante hepático tem como objetivo remover os focos de infecção e orientar os pais sobre a importância da higiene bucal em todas as etapas do processo. A compreensão da doença hepática permite que o dentista escolha o tratamento odontológico ideal e, no caso de crianças, o manejo comportamental é indispensável para o sucesso do tratamento.

Palavras-chave: Atresia Biliar, Transplante de Fígado, Criança, Odontopediatria, Assistência odontológica.

Introduction

Liver transplantation (LT) is the treatment of choice in liver failure[1,2], either by acute liver failure or chronic liver disease. The most common causes in children are intrahepatic and extrahepatic cholestasis and metabolic disorders[3]. One of the most frequent diseases in the pediatric population is biliary atresia (BA), responsible for 30-50% of liver transplantations[3]. These patients may undergo portoenterostomy surgery or Kasai surgery, consists of performing the excision of the fibrotic biliary remnant, with transaction of the fibrous portal plate and dissection extending up to the bifurcation of the portal vein[4]. However, liver transplantation will be indicated in cases of late diagnosis, portoenterostomy failure, recurrent cholangitis, and progressive portal hypertension[5].

Pediatric LT has evolved significantly in the past 40 years, showing a high long-term survival rate with success rates above 85% in large transplant centers[3]. This improvement is due to the evolution of surgical techniques, preservation of donated organs, and discovery of immunosuppressants, including the worldwide experience of transplant teams[6]. Thus, LT can happen in two ways: by a deceased donor or a living donor[7], and usually by one of the recipient's parents or close relatives[8]. In Brazil, 54% of the LTs are performed with living donors[9].

In the days preceding an LT, both recipient and donor must have a dental consultation[10]. Initially, a dentist evaluates the oral health status before transplantation to remove any focus of oral infection[2] and guides the family and the child about the importance of oral hygiene. Moreover, the dentist may detect possible oral changes caused by liver disease along all the stages of LT. Oral alterations commonly seen in these patients include green teeth, gingival hyperplasia, dental hypoplasia, gingivitis, and dental caries[11-13]. If after the intraoral examination of the child, in the phase before transplantation, there is a need for treatment, such as dental extraction or gingival surgery, should be sought laboratory exams, like as complete blood count and coagulation tests, to planned the surgeries with security[14].

Another aspect to be considered when treating young children with liver disease is behavioral management, which must combine knowledge in oral medicine with special dental care and pediatric dentistry. Thus, the goal of this case report was to describe dental management for a pediatric patient and its importance to be done before liver transplantation.

Ethical aspects and study protocol

This case report complies with resolution 466/12 of the Brazilian National Health Council and the guidelines set by the Helsinki Declaration, also being prepared according to the CARE guidelines.15 The patient's mother had read and signed an informed consent form for dental treatment and scientific reporting of the case.

Case report

A five-year boy, who is the only child of non-consanguineous parents, was referred for dental treatment before LT. At five days of life, the child had neonatal cholestasis with persistent jaundice, choluria and fecal acholia, including a diagnosis suggestive of BA obtained from a liver biopsy. At 23 days of life, Kasai portoenterostomy was performed under partial drainage conditions. There was a slight improvement in total bilirubin levels and fractions but without normalization of the rates. Subsequently, there was an increase in total bilirubin and fractionated levels (Table 1) and a worsening of portal hypertension. At six months of age, the child continued showing a standard clinical picture of obstructive cholestasis compatible with BA, which indicated liver transplantation. The child was followed up by a multidisciplinary team of pediatricians, hepatologists, anesthesiologists, cardiologists, nutritionists, psychologists, and a dentist during preparation for LT.

At the first dental appointment, an extra-oral physical examination revealed that the patient presented with jaundice in the skin and eyes, alopecia areata in the right occipital region, bilateral telangiectasia in the face, digital clubbing, and ascites. Furthermore, the intra-oral examination observed jaundice in mucous membranes, numerous caries lesions, and poor hygiene (Figures 1 A and B). Due to poor oral health, a treatment plan was proposed consisting of laboratory tests (hemoglobin, leukocyte and platelet values, bilirubin level, INR value, as well as thrombin and prothrombin time), behavioral management, dental extractions, and dental restorations. The timeline of the procedures made is shown in Table 1.

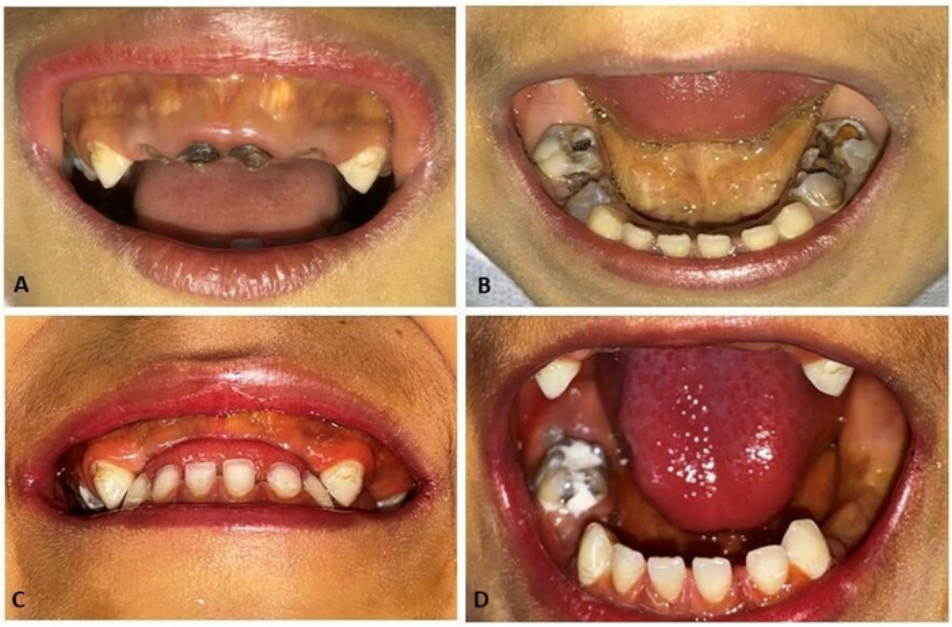
These procedures included dental prophylaxis and dental restorations performed according to the optimal timing of laboratory findings (Table 1). Thus, all dental restorations used glass ionomer cement. For invasive procedures (e.g., dental extractions) to avoid hemorrhagic events, a hemostatic paste composed of two tranexamic acid 250 mg tablets, macerated and mixed with 1/3 of anesthetic with a vasoconstrictor (e.g., mepivacaine hydrochloride 2% with epinephrine 1:100.000 - Mepiadre, DFL) was used. The maximum anesthetic dose was calculated based on the child's weight and liver toxicity, resulting in a 2.7 mL dosage, according to the package leaflet.

Table 1. *Timeline of the medical and dental histories.*

Timeline			
Medical history			
Date:	Occurrences:		
5 days of born	Neonatal cholestasis Persistent jaundice Dark urine Fecal acholia		
23 days of born	Kasai Surgery Slight improvement in the rates of bilirubin fractions		
6 months	Alterations in the rates of bilirubin fractions Values of the bilirubin rates: Total Bilirubin (TB) and Direct Bilirubin (DB) 26/05/2016: TB (10.9 mg/dL) DB (8 mg/dL) 29/05/2016: TB (10.3 mg/dL) DB (7.33 mg/dL) 31/05/2016: TB (7.31 mg/dL) DB (6.51 mg/dL) References values TB (<8.0 mg/dL) and DB (0.0 a 0.6 mg/dL) Cholestasis Indication to LT		
Years: 016; 2017; 2018; 2019	Recurring hospital admissions		
2021	Exams	Minimum and maximum value	Reference values
	Hemoglobin	8.0-8.8 g/dL	12.5 ±1.5 g/dL
	Platelets	36 – 45 mil/mm³	150-400 mil/mm³
	Leukocytes	3.27 – 4.31 mil/mm³	5-17 mil/mm³
	Prothrombin time	17.8 -19.6 seg	-
	Prothrombin activity	41-45.6%	70-130%
	INR	1.62 – 1.80	1.00-1.20
	Partial Thromboplastin Time	30.8 – 40.1 seg	-
	Urea	26.7-31.6 mg/dL	7-18 mg/dL
Dental history			
Intraoral exam:	Oral mucosa jaundice Carious lesions in multiple teeth Root debris with presence of infection Tongue coating and poor oral hygiene		
Dentistry Treatment			
1st session: Oral hygiene orientation; Prophylaxis; Restoration on tooth 85 with ionomer glass			
2nd , 3rd, 4th and 5th session: Teeth extractions.			
6th session: Restoration 54 and 65 with ionomer glass; Prophylaxis; Fluoride varnish on all teeth; Oral hygiene orientation.			

All extractions were performed under protective stabilization with the assistance of the child's mother. After the procedures, antibiotics (Amoxicillin 125 mg/5mL) and analgesics (Dipyrone 500 mg/mL) were prescribed, with the latter for pain.

A new appointment with the parents was scheduled to give oral hygiene instructions and emphasize the importance of keeping the child in good oral condition, not only in the pre-transplantation period but also in the follow-up after LT. A final report on



Figures 1. *A) Intra-oral view: Jaundice is observed in the mucosa; root remains in the upper central and lateral incisors; active white spot lesions (caries) in the upper canines; B) Jaundice is observed in the floor of the mouth; extensive caries lesions in the right and left lower molars; C and D) Intra-oral view after completion of the proposed dental treatment: icteric mucosa; excellent tissue repair in the regions of the extraction; improvement of oral hygiene.*

dental management was prepared before referring the patient for LT. Figures 1 C and D showed an improvement in oral hygiene.

Discussion

The elimination of oral foci of infections in systemically compromised pediatric patients, especially those who are immunocompromised, reduces the risk of opportunistic infections, which can exacerbate the overall systemic disease[16,17]. After the dental treatment is performed, that must include in many instances invasive procedures, it is essential oral hygiene education for parents or caregivers.

Specifically in children with liver disease, some factors are considered before oral surgery due to changes in the hematological status[18]. These alterations can lead to excessive bleeding, and the use of local hemostats is recommended. Also, the chance of infections increases in leukopenic patients, and the use of antibiotics and adjustment of medication doses must be used. Another important factor to be considered is the stage of liver failure, which places the pediatric patient in priority placement in the liver transplant waiting list[16].

The literature mainly describes the reference values for the oral management of adults with liver failure with no need for blood transfusion such as platelet values of ≥ 16.000 and INR value of ≤ 3.0. In these cases, the use of local hemostatic measures is recommended[17-18]. These parameters

are not established for children and oral surgeries.

Some studies compare the laboratory values of adults and children with liver disease, concluding hat there are differences in the defects in fibrinogen and platelets in both groups[19]. The AAPD (American Academy of Pediatric Dentistry) reinforces the recommendation of local hemostasis agents in this cases[20].

The liver performs several fundamental blood-clotting functions in primary and secondary hemostasis. The deficiency of coagulation factors may occur due to a decrease in the function of hepatocytes and a decrease in vitamin K, meaning that bleeding events are a common finding as well as in adults and children[21]. In this sense, we noticed anemia, leukopenia and thrombocytopenia according to the parameters of the child's laboratory tests, including changes in prothrombin activity, INR and uremia. All these factors can lead to bleeding during oral surgeries. In the present case, despite the low number of platelets, all the surgeries were performed without needing platelet transfusion.

For this reason, the use of local hemostatic agents is essential. Tranexamic acid (TA), fibrin sponges and optimal suturing techniques prevent local bleeding. TA is an anti-fibrinolytic agent that helps to promote hemostasis, thus preventing the proteolytic degradation of fibrin. TA is typically used for local hemostasis in dental procedures, and its efficacy is well-established in the literature[22]. Due to these characteristics, TA was the hemostatic agent chosen for all surgeries associated with suturing and removal of threads after seven days, provided that the tissue is repaired.

The insertion of tranexamic acid paste into the alveoli was only possible due to the alveolar remnant present soon after tooth extraction, due to lack of root resorption of primary teeth. Thus, according to the age of the child, we can suggest that permanent teeth 24, 34, 35 and 44 were in Nolla's stage 3, in which only 1/3 of the clinical crown is formed; teeth 12 and 22 were in stage 6, with the entire clinical crown formed. Teeth 11 and 21 were in Nolla stage 7, with 1/3 of the roots formed[23]. The absence of physiological root resorption can be difficult to tooth extraction, especially in deciduous posterior teeth. Due to its anatomical characteristics as smaller and more divergent roots, are prone to fracture during surgery[24]. These anatomical alterations can lead to longer surgical times, increasing the likelihood of bleeding and infections.

Regarding behavioral management, the literature suggests that outpatient dental care for young children should be performed with the help of some techniques, such as tell-show-do, positive reinforcement, modeling, voice control and protective stabilization[25]. In addition, drug sedation and sedation with nitrous oxide can be helpful in some cases. If these techniques fail, oral rehabilitation under general anesthesia may be a viable option. However, the current clinical condition must be considered in individuals with liver disease.

Conclusion

Dental care is essential in cases of liver transplantation. This step aims to remove infectious foci, prevent acute or chronic infections, and guide the parents about the importance of oral hygiene. Understanding the liver disease allows the practitioner to choose the laboratory tests necessary for planning the dental treatment of each case. It is also essential to know the behavior of a pediatric liver patient for dental management and observe the patient's chair time. Furthermore, the dental treatment should be planned in partnership with the medical team.

Conflicto de Intereses

Los autores declaran no tener conflictos de intereses con respecto a la publicación de este artículo.

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