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LIVER DISEASE: CURRENT PERSPECTIVES ON DENTAL MANAGEMENT

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ABSTRACT: Liver dysfunction may be attributed to a number of causes, including lifestyle habits and other acquired infections and conditions. The patient with liver disease presents a significant management challenges for the dentist because the liver plays a vital role in metabolic functions. The purpose of this article was to review various risk factors, and the management of complications that occur in liver diseased patients while undergoing dental treatment.

KEYWORDS: Liver dysfunction, Dental, Treatment.

INTRODUCTION

The liver is a large organ, that occupies the upper right quadrant of the abdomen. It develops as an outgrowth of the gut. The liver will retain normal function until 85% damaged. Liver diseases may range from mild disease to liver failure. The patient with liver disease presents a significant management challenge for the dentist because it plays a vital role in metabolic functions, including secretion of bile needed for fat absorption, conversion of sugar to glycogen, and excretion of bilirubin- a waste product of hemoglobin metabolism, synthesis of coagulation factors and drug metabolism. Impairment of liver function can lead to abnormalities in the metabolism of amino acids, ammonia, protein, carbohydrates, and lipid, drug metabolism. Significant bleeding may be a dental problem. Viral hepatitis and alcoholic liver disease are the most common liver disorders[1]. So when treating a patient with dental problems we should have knowledge and awareness of the abnormalities that are caused by liver diseases to prevent the complications.

Complications to be considered when treating patients with liver diseases are as follows

1. Bleeding disorders,
2. Impaired metabolism and increased risk of drug toxicity,
3. Cross infection and risk of hepatitis B, C, D.
4. Possible immunocompromised status[2].

Bleeding disorders:

Patient evaluation and history should begin with standard medical questionnaires. Patients should be asked about any previous unusual bleeding episode after surgery or injury, spontaneous bleeding and easy or frequent bruising. A complete drug history is important. If a patient is taking anticoagulant drugs, it will be important to consult his or her physician before any major surgical procedure. In addition, a number of medications may interfere with hemostasis and prolonged bleeding. Drugs of abuse, such as alcohol or heroin, may also cause excess bleeding[3] by causing liver damage resulting in altered production of coagulation factors.

Evidence of petechiae, ecchymosis, hematomas or excessive gingival bleeding should direct the dentist's attention toward a possible underlying bleeding disorder. The incidence of dental caries and periodontal diseases is higher in patients with bleeding disorders, which may be because of lack of effective oral hygiene and professional dental care due to fear of oral bleeding.A bleeding tendency results from depressed synthesis of blood-clotting factors and excess fibrinolysis so, Prothrombin time (PT), the interenational normalized ratio (INR) and activated partial thromboplastin (APTT) are all increased. Chronic bleeding may cause anaemia.

Preoperative laboratory tests of the hemostatic system[4,5] are:

1. Bleeding time to determine platelet function (normal range: 2–7 minutes).
2. Activated partial thromboplastin time to evaluate the intrinsic coagulation pathway (normal range: 25 ± 10 seconds).
3. International normalized ratio to measure the extrinsic pathway (normal range: 1.0)
4. Platelet count to quantify platelet function (normal range: 150,000–450,000/μL).

Essential factors for appropriate dental management [6]

1. Comprehensive and current medical and dental histories
2. Consultation with and/or referral to treating physician(s) prior to dental treatment
3. Appropriate laboratory investigations
    a. Complete blood count with differential (erythrocyte count, leukocyte count, hemoglobin, hematocrit, platelet count)
    b. Prothrombin time
    c. Partial thromboplastin time
    d. International normalized ratio
    e. Bleeding time
    f. Liver function tests
    g. Others as needed
4. Minimization of soft tissue trauma during dental procedures
5. Consideration of hospital setting for advanced surgical procedures or severely coagulopathic patients

Impaired metabolism and increased risk of drug toxicity

Liver disease may have complex effects on drug clearance, biotransformation, and pharmacokinetics, Pathogenetic factors include alterations in intestinal absorption, plasma protein binding, hepatic extraction ratio, liver blood flow, portal-systemic shunting, biliary excretion, enterohepatic circulation, and renal clearance. Sometimes alterations increase levels of bioavailable drug, causing normal drug doses to have toxic effects[7].
Local anesthetics should be administered cautiously to patients with hepatic impairment. Most amides are primarily metabolized in the liver and therefore may reach toxic levels with lower doses of anesthetic. Judicious use or avoidance of prophylactic and therapeutic dental medications that are metabolized in the liver that impair hemostasis.

- Analgesics (acetaminophen, non-steroidal anti-inflammatory agents, opioids)
- Anesthetics
- Local (amides)
- General (halothane)
- Antibiotics (ampicillin, tetracycline)
- Antiplatelets (aspirin)
- Sedatives (long-acting benzodiazepines, barbiturates)

Detailed use of drugs in patients with liver diseases is given in **Table.1**

Cross infection and risk of hepatitis B, C, D

In a dental office, infections can be expedited through several routes, including direct contact with blood, oral fluids, or other secretions; indirect contact with contaminated instruments, operatory equipment, or environmental surroundings; or contact with airborne contaminants present in either droplet splatter or aerosols of oral and respiratory fluids[10].

A significantly higher incidence of HBV infection among dental staff is found. A higher rate of HBV infection especially among oral surgeons, periodontists, and endodontists. HBV infectants in periodontal practice are blood, saliva, and nasopharyngeal secretions. Intraorally, the greatest concentration of hepatitis B infection is in the gingival sulcus. Severity of gingival bleeding, and bad oral hygiene are said to be associated with the risk of HBV. Blood is very often found in the aerosols produced by the dental equipments such as an ultrasonic scaler or other high-speed equipments. Ultrasonic scaling is obviously associated with increased air contamination levels.

Precautions during Dental treatments

1. Altered blood screening tests: physician's opinion is required for treatment and postponement of elective treatment. Emergency treatment, if required should be done in hospital setting.
2. Strict sterilization protocol should be followed.
3. The most important precaution with HBV and HCV in dental settings is to prevent the risk of viral contagion to the dental professionals as well as the patients (cross-infection). HBV and HCV remain stable at room temperature for up to 5 days and persist on various dental operatories. Universal precautions should be taken while treating known patients to prevent cross-infection.
4. American dental association strongly recommends that all dental healthcare workers should receive vaccination against hepatitis B.
5. Caution should be taken while administration of local anesthesia and sedation. Local anesthetics are usually safe if total dosagedoes not exceed 7 mg/kg in combination with vasoconstrictor.
6. Liver diseases are associated with a decrease in plasma coagulation factor concentrations. Minimal trauma to optimize hemostasis, careful surgical technique, pressure application to control bleeding, and use of local hemostatic agents are recommended.
7. Local hemostatic agents that can be used are as follows: oxidized and regenerated cellulose, anti-fibrinolytic agents (transexamic acid), fresh plasma, platelets, and vitamin k.
8. Surgery is contraindicated in patients with acute hepatitis, acute liver failure, or alcoholic hepatitis.

Table.1 Usage of Drugs in patients with liver diseases[8,9]

Drug	Use in patients with liver disorder	Comments
Acetaminophen	Yes with modifications	To be given in divided doses < 4.0 gm per day for up to 2 weeks without adverse hepatic effects.
Amide local anesthetics (Llidonocaine &Mepivacaine)	Yes with caution	Lidocaine has a large and rapid volume distribution. Only 6% of injected volume is present in blood and minimal elevation of peak blood concentration occurs after single dose which is clinically insignificant.
Aspirin and NSAIDs	Avoid	A decreased serum protein levels cause increased toxicity of drug as they are protein bound causing more free drug availability
Benzodiazepines	Yes with modifications	Decreased metabolism causes increased sedation also receptors in brain are more sensitive. Dosage to be reduced with less frequent intervals. Use drug without active metabolite (e.g., alprazolam, lorazepam) rater than with active metabolite(e.g., diazepam)
Beta lactam antibiotics (Penicillin, Amoxicillin)	Yes	Elimination of drug is mainly by renal filtration and tubular excretion. Penicillin, ampicillin, amoxicillin, cepalexin, and cefazolin are well tolerated.
Clindamycin	Avoid	It causes progressive liver disease causing more damage.
Azithromycin	Avoid	It is principally eliminated by liver, so to be
Clarithromycin	Yes with cautions	Concentration with mild to moderate liver disease does not differ from those in patients with normal hepatic function.
Erythromycin	Avoid	Half life has been increased in patients with impaired hepatic function.
Metronidazole	Yes with caution	Dose of 500 mg be given on a 12 hourly
Codeine	Yes with modifications	Codeine is rapidly distributed to spleen, kidney, and liver. Its derivatives e.g., oxycodone can be used in liver disease but with increased dosage interval.

Immunization protocol :

Every Dental staff should be aware of vaccination to be done as follows

1. HBV vaccination for all dental staff: 0,1,6 months
2. 1 month later: test for HBV immunity – Anti-HBs (80% of persons become immune)
3. If anti-HBs titer is low, consult a physician for rescheduling vaccination protocol.
4. Anti-HBs titer reassessed every 4 years

CONCLUSION

In our routine practice we may come across liver diseased patients. As a dentist, we should have knowledge and awareness of the various risk factors before treating the patient for any dental procedures particularly extractions, periodontal treatments, endodontic treatments etc. For every patient a detailed past and present medical history is necessary, so that, we can prevent possible complications of severe bleeding, spread of infection , and adverse drug interactions .

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