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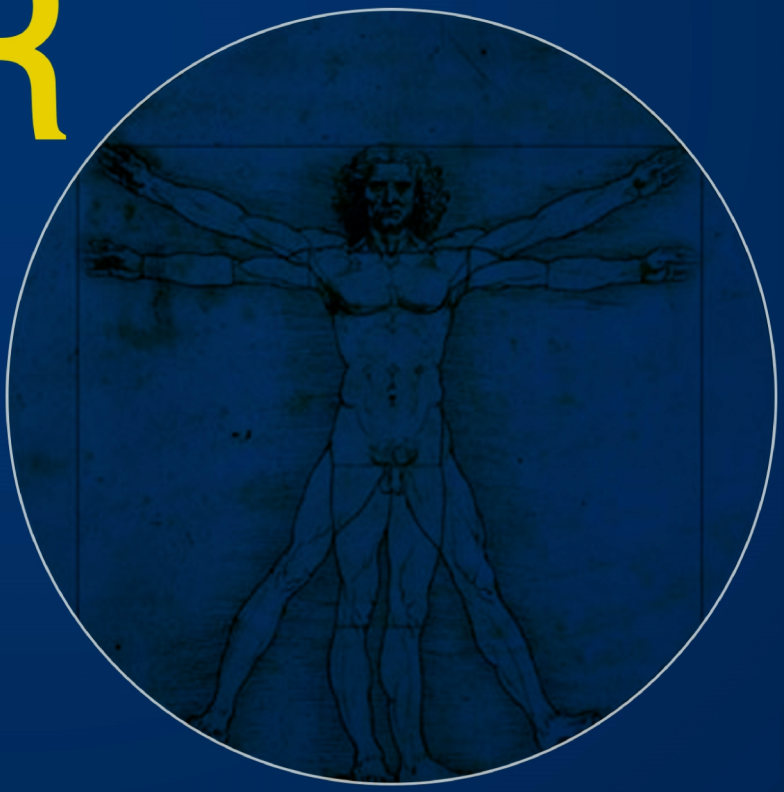

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Editorial

Prezado leitor,

Disponibilizamos a décima edição, volume dois, do periódico ***Brazilian Journal of Surgery and Clinical Research – BJSCR****.*

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Mário dos Anjos Neto Filho
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Happy reading!

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Sumário summary

ORIGINAL STUDY

CASE REPORT – MEDICINE

CASE REPORT – DENTISTRY

PHOTODYNAMIC PROCESS MEDIATED BY PROTOPORFIRIN IX DECREASE THE VIABILITY OF *Candida krusei*

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ABSTRACT

Candida krusei is present in infectious processes and shows an intrinsic resistance to fluconazole. The photodynamic therapy (PDT) uses a photosensitive agent and a light source to generate reactive species of oxygen. The aim of this study was to evaluate the efficacy of PDT mediated by PPIX against *Candida krusei*. The suspension of *C. krusei* (ATCC 6258) containing 10^6 CFU/ mL (Abs = 0.680, λ = 530 nm) was prepared. *C. krusei* was placed on Sabouraud dextrose agar (SDA) and incubated at 37 °C for 24 h. Was used a laser emission source with diode light (LED) (50 mW, 660 nm, 30 J/ cm^2). It was used protoporphyrin IX (PpIX) at the final concentration of 5 mM. PpIX was incubated for 30 min and irradiated; after this step, the cells were placed, and thereafter counted (results were expressed: log CFU/ mL). The tetrazolium salt (MTT) assays were performed to evaluate the mitochondrial activity. There is a significant reduction in the number of CFU Reduction/ mL when compared with other groups. The MTT also showed a reduction of mitochondrial activity, both results may be associated with effectiveness of PDT. We can conclude that PDT has fungicide effect, inhibiting the cellular growth and activates the mitochondrial damage.

KEYWORDS: Photodynamic therapy, *Candida krusei*, cell viability.

1. INTRODUCTION

Photodynamic therapy (PDT) is a therapeutically modality that uses a combination of photosensitizer agent and light source, in the oxygen/nitrogen presence, which produces reactive species, such as free radicals, causing cells damages and/ or cellular death. This sensitizer agents, are called photosensitizer. They do not exhibit toxicity alone, but could be toxic when combined with a light[1,2,3].

Photodynamic therapy has been applied to many types of cancers and has been focus of many studies for antimicrobial treatment[1,4,5,6]. Photoporfin IX (PpIX) is a sensitizer agents, derivate of haematoporfirin, a compound approved by the Food and Drug Administration for treatment of endobronchial and esophageal tumors in the U.S.A; currently, PpIX has been used for others clinical treatments[7].

Whereas its increase of fungi resistance to antibiotics, new alternatives to treatment of infectious diseases are required. Due to this, PDT treatment has been a modality that does not offer risk of resistance increase of pathogenic fungi[8]. The Candida species are frequent founded in normal human flora, but in immunocompromised patients, Candida species may cause mucocutaneous and systemic infection[7,9,10,11].

The *Candida kusei* is the specie related to infection by Candida, representing 2% of the infections[12,13]. The *C. krusei* had an intrinsic resistance to fluconazole due to this antifungal agent be the first option on antifungal therapy. Thus, the aim of this study was to evaluate the efficacy of PDT mediated by Protoporfirin IX-against *C. krusei*.

2. MATERIAL AND MÉTHODS

Candida krusei

Were used the strain *C. krusei* (ATCC 6258). The cells were grow seeded onto Sabouraud dextrose agar (SDA) (Difco, Detroit, MI, USA) and incubated for 24 h at 37 °C. After incubation, the microorganism was cultured in Brain Heart Infusion (BHI) broth (Difco) for 24 h at 37°C. To adjust the suspension concentration of 10^6 Colony Forming Unity (CFU)/ mL, the cells were quantified by spectrofotometry (λ: 530 nm, Abs: 0.680).

The cell suspension was divided in four assay tubes with 1 mL each. The tubes containing the cell suspension was named as (L-P-): representing a non treated group (n=10). (L-P+): representing a cell suspension group treated only with PPIX (n=10). (L+P-): representing a cell suspension treated only with light from LED (n=10). (L+P+) representing a cell suspension group treated with

photodynamic therapy (n=10). The letter "L" means Light and the letter "P" means photosensitizer.

PDT mediated by PPIX

PpIX was prepared by dissolving the salt in DMSO at the concentration of 500 µM. For the use in PDT the suspension were diluted 1:100 (5 µM) for the incubation with the cells. After of the dilution of PpIX in the suspension of *C. krusei* (10^6 CFU/ mL) the cells were incubated with PpIX for 30 min at 37°C. After this the cells were irradiated with a Laser Diode Emitted (LED) with wavelenght of 660 nm with a light dose of 30 J/ cm^2. The cells irradiated were putted in to SDA and incubated at 37 °C and the colony were counted and quantified.

MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl--2*H*-tetrazolium bromide) assay

The reduction of tetrazolium salts such as MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2*H*-tetrazoliu m bromide] or water-soluble tetrazolium derivatives (in the presence of membrane-permeant redox mediators, such as phenazine methosulfate) to purple formazan products is a quick and dirty indicator of the availability of reducing power in a cellular preparation[14].

After the PDT treatment, the cultured *C. krusei* were washed by centrifugation (8,000 xg for 10 min) and incubated with 20 µL MTT solution (0.5 mg/mL) at 37°C for 3 h. After this period, tubes containing MTT-cell suspension were centrifuged for 10 min at 400 × g to form cell pellet. The supernatant was discarded and 100 µL DMSO was added to the colored cell pellet. Finally, 100 µL of the purple-colored suspension was transferred to a 96 well microplate and analyzed using spectrophotometry (570 nm). DMSO was used as a blank.

Statistical analyses

The statistical analysis was performed using the Prism software program (GraphPad Inc., San Diego, CA, USA). Normality (Kolmogorov–Smirnov test) and homogeneous variance tests (Bartlett's test) were applied to all variables. Parametric tests (analysis of variance with Tukey's multiple comparison post-test) were used for cases with normal distributions and homogeneous variances. Non-parametric tests (the Kruskal–Wallis test with Dunn's multiple comparison) were used for cases with non-Gaussian distributions. Differences with p-values <0.05 were considered significant.

3. RESULTS

The L+P+ group showed cell reduction when compared to the other groups (Figure 1), suggesting that photodynamic action of reactive oxygen species induces cell death (p = 0.0133).

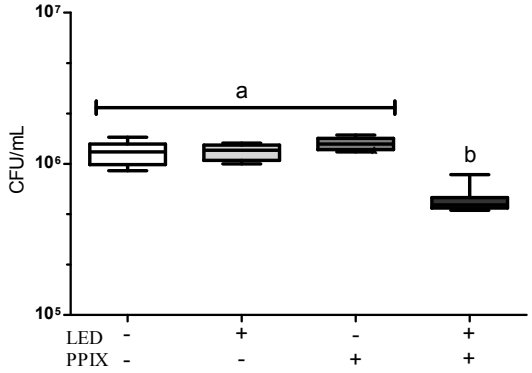

Figure 1. *Candida krusei* colony reduction in cell groups. The Y-axis represents the quantification of colony forming units (CFU) of yeast cells per milliliter (mL). In the X-axis, indicates absence (-) and/or the presence (+) of protoporphyrin IX (PpIX) and / or the Emitted Laser Diode (LED).. The letters a and b indicate statistically significant differences between them ($p < 0.05$). Nonparametric test was used for analysis of graphic.

In order to obtain another cell viability test, the MTT assay was performed. In this test it was possible to observe that PDT (L+P+) reduced the viability of the yeast, observed by decreased mithocondrial activity when compared the other groups (Figure 2).

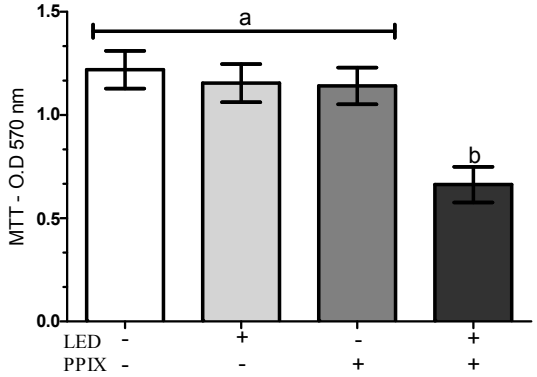

Figure 2. Values os Formazam produced after PDT treatment. The Y-axis represents the reading of the wavelength for the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazolium bromide) assay (MTT). In the X-axis, indicates absence (-) and/or the presence (+) of protoporphyrin IX (PpIX) and / or the Emitted Laser Diode (LED). The letters a and b indicate statistically significant differences between them ($p < 0.05$). Parametric test were used for analysis of graphic.

4. DISCUSSION

This study evaluated in vitro a viability of *C. krusei* after photodynamic therapy mediated by PPIX treatment. As targeted, our results let us observe that, after a PDT there was an reduction of CFU/ mL, similar to study conducted by Bliss *et al.* (2004)[15], were the authors showed that there was an reduction in the CFU/mL number after PDT exposure. In our study the reduction was significant, but not like the results presented by Bliss *et al.* (2004)[15]; maybe this fact can be associated to some differences of drug or time of incubation.

Protoporfin IX belongs to porphyrin class, and even if is the same class of drug, differences on therapeutic effect is observed. Porphyrin is derivated from hematoporphyrin that is approved by the U.S. Food and Drug Administration for the treatment of endobronchial and esophageal[15].

Lambrechts (2005)[4] has performed some studies with porphyrin to understand the mechanism of action, they observed the uptake capitation of the drug by the cell and the toxicity. In our study, the PDT process does not caused a high toxicity in the cells tested (showed by only 1 log diminution cell viability). Furthermore, the photodynamic action is dose dependent (for photosensitizer and for light) and, to solve this, more PDT sections can be performed in order to achieve more effectiveness in *C. krusei* kill.

It was measured in our study that the metabolic activity is affected by this therapy. The use of MTT test showed and decrease of mitochondrial activity after PDT treatment[4], in our study also observed and reduction of mitochondrial activity of Candida species. This damage on metabolism occurs in order to generation of reactive oxygen species (ROS) inside the cell after a light exposure in association with the drug, causing an inactivation of mitochondrial enzymes and proteins, involved on energy production. In a study performed by Hilf (2007)[16], the focus of mitochondria as an target of PDT was studied. This author observed the presence of many enzymes essential to metabolism before and after the PDT treatment. In his study he could observed and reduction of Na^+K^+ ATPase, pyruvate kinase and others enzymes associated with mitochondrial activity in tumors cells of rats, testing the Photofrin II.

With these data we can observe that, the potential activity of PDT against yeast, like Candida species, have a direct influence in your metabolism even if there is no death, cells have your metabolism degraded.

5. CONCLUSION

Considering the limitations of this study, the results permits to conclude that the Photodynamic therapy presents a potential fungicide effect against *C. krusei* and some improvements on this technique are required to kill a major number of cells.

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ERGONOMIC EVALUATION OF WORK IN STERILIZATION MATERIAL AREAS IN A BASIC HEALTH UNIT

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ABSTRACT

The objective of this study was to develop an Ergonomic Work Analysis (EWA) in product sterilization area for health in a Basic Health Unit in western Santa Catarina, Brazil. The ergonomic approach followed four distinct stages characterized by demand analysis based on Collegiate Directory Resolution (CDR) 15 - National Health Surveillance Agency: analysis of tool construction of the minimum security of Material and Sterilization Center (MSC); tool construction for identification of compliance or not the tasks performed on MSC; instruments application; proposal formulation for adequacy of non-conformities found. The systematic showed possible situations to cause damage to health of workers and users of the health service involving: conformation of the physical structure and the organization of sterilization processes. Thus, the EWA, allowed greater interaction between teaching and service enabling point more accurately the risks in the workplace and formulate joint proposals for improving these conditions.

KEYWORDS: Occupational Health Nursing, health management, occupational health, sterilization, education, nursing.

1. INTRODUCTION

The health policy worker in Brazil has been drawing since the promulgation of Brazilian Constitution in 1988[1], and in 1990, the federal Health Law defines occupational health as "*a set of activities intended*, [...] *the promotion and protection health of workers* [...] "[2]. However, only in 1998, via Administrative Rule 3120 approving the Normative Instruction of Health Surveillance Worker at Health System was published with the purpose of defining basic procedures for the development of their actions, in order to minimally equip the sectors responsible for supervision and protection of health, incorporating into their practices mechanisms of analysis and intervention in the processes and workplace[3].

The Worker's Health Surveillance comprises many continuous and systematic action, over time, to detect, to know, research and analyze the determinants and conditioning of health problems related to the processes and work environments, in its technological aspects, social, organizational and epidemiological, in order to plan, implement and evaluate interventions on these aspects to eliminate them or control them.

The Decree 7602, November, 7, 2011, establishing the National Policy on Safety and Health at Work (NPSHW), which aims to promote health and improve the worker's quality of life and the prevention of accidents and damage to health coming, work-related or occurring in the course of its occupancy, through the elimination/ reduction of risks in the workplace[4].

The actions in the context of NPSHW, should be developed following the guidelines of promoting implementation of systems and safety and health management programs in the workplace; restructuring of occupational health, training and safety at work and the encouragement of training and continuing education of workers; and, via promotion of integrated agenda of studies and research on health and safety at work.

In this context, many preventive actions in the workplace should be part of the set of company policies. Initially, the safety and health of workers are related to the development of industrial activities.

Whereas, the Basic Health Units make use of health products for the procedures performance which need to be processed in order to minimize the risk of contamination. In this way, CDR 15, March, 15, 2012, published by National Health Surveillance Agency, standardized the minimum elements to be considered for the sterilization process to occur in a secure mode, ensuring the quality of this process[5].

The proposed adaptation of the physical structure and the current work process in the materials sterilization

area of dental-medical-hospital supplies in a Basic Health Unit was developed in partnership with the State University of Santa Catarina (UDESC), with the Municipality of Chapecó (Health Secretariat), Santa Catarina State, Brazil. The proposal aims at an ergonomic intervention where the researcher comes out of the analyst position to take a participatory approach, as an actor in the process of design of the work environment improvements.

Considering that the work (the activity) is the result of various activities and tasks performed by different workers, when the work is divides into parts, is possible to understand how does it works, to account for proposing changes allow (re)organize the work, optimizing human and financial resources.

The ergonomic intervention foresees the development of a few steps to the reorganization of work occur in order to involve the service and workers in planning these changes, by inspection of the viability (demand analysis) using: observation, primary diagnosis, depth analysis, the study of improvements proposition and validation of work reorganization proposal by the professionals.

The EWA is based on characterization, analysis and understanding of the work through confrontation of the prescribed work, i.e., the task to be performed and the actual work, i.e, the activity performed by the worker to achieve the task compliance. An example of the prescribed and actual activity occur in the sterilization process, and the rules about how to do the task, characterized as prescribed work, while the workers are performing this activity in its own way.

Due to the complexity and the cost associated with equipment and instruments involved in the sterilization process, is of great importance all health institutions use a theoretical framework to guide this process, investing in the training of professionals[6].

The quality of the sterilization process depends on its monitoring, observation and record the performed activities ensure process efficiency, being able to evaluate all phases of sterilization in order to detect possible failures, where, and how, it will happens; the biological monitoring of the sterilization center should occur every week and require the use of a record book, in order to register the results.

Anticipate, recognize, evaluate and control the existing environmental risks in the workplace is essential and mandatory task for any company that admit workers as employees[7]. These measures must be taken in order to maintain the integrity of workers.

Several tools have been used for risk analysis according to the literature. However, considering the complexity of the workplace for the sterilization process, we opted for the development of "checklist" based on current legislation, which the study Burmann & Amaral (2008)[8], proved relevant for these workplaces with many specificities.

Thu, this study presents a system for risk analysis in sterilization room of health products in a Basic Health Unit in order to identify, evaluate and present possible improvement actions to, the risks are not eliminated, at least be reduced to minimum acceptable levels. Therefore, the aim of this study was to develop an Ergonomic Work Analysis (EWA) in the field of sterilization of medical devices in a Basic Health Unit in western Santa Catarina, Brazil, based on the CDR 15[5].

2. MATERIAL AND MÉTHODS

To develop the EWA in the sterilization department for Basic Health Unit became the deepening of literature on the sterilization process to identify the minimum requirements to be met during this activity.

Our study was exploratory and descriptive, with a qualitative approach, resulting in a model for the analysis of working conditions in material and sterilization center in a Basic Health Unit. The methodological procedures are based on ergonomic approach to problem, consisting of observations and descriptive analyzes of situations observed together with professional that service. The main steps were followed:

1) Analysis of demand: were consulted the coordination of primary care, and the coordinator of the Health Unit under study, as well as workers involved in the sterilization process for identifying the real needs of the sterilization area of health products, based the CDR 15[5];

2) Application of analysis tool to the minimum conditions of safety to MSC: we developed a checklist for evaluating of the workplace conditions and procedures involving the material sterilization area. The items on the checklist were based on the CRD 15[5].

3) Construction tool for identification of compliance and noncompliance resulting from the tasks performed on MSC.

4) Proposal formulation for adequacy of non-conformities found.

* Demand Analysis

Whereas all work is related to an initial demand, this study was guided by research conducted in the Health Basic Unit in western Santa Catarina (Brazil) that link some weaknesses of the sterilization process, including the improper flow of materials in the sterilization areas, in disagreement with current legislation, as well as flaws in the labeling of products for the health, sterilization time, the records and the sterilization process validation tests performed.

However, it is possible that the managers of health services, which often hold political and/ or administrative positions, lack the technical knowledge to identify and intervene in dangerous situations.

Aiming the development of a work that accrues benefits to workers, the analyst must take into account the initial demand and make a local study of the processes and workers to identify possible needs for improvement. In this study, the demand analysis, were characterized by distinct stages:

a) Local reconnaissance to identify the existence of problems and establish a hierarchy in need of solving these;

b) Conversations with the professionals about the theme "sterilization" so they can help in understanding processes and elucidation of possible solutions;

c) Data analysis to identify the situations that deserve more attention/ intervention to improve the health and safety of health workers and users.

* Construction and application of the tool used to analyze the physical structure and the sterilization process developed by workers in the reprocessing of materials in Basic Health Unit

a) Checklist development:

The development of this tool, nominated checklist should include all the provisions necessary for a company to identify possible flaws in the safety and health of location for further indication of what measures to control or eliminate the risks. It is emphasized that the tool should not be much extensive to not harm the peculiar agility of this type of evaluation.

Having the CDR 15[5] and 50[9], the recommendations of Brazilian Society of Surgical Center Nurses and Brazilian studies, one can make a checklist that contains the main legal provisions and necessary to maintain the safety and health of workers and users of health services.

The checklist has been structured to facilitate data collection, following a logical order, starting from the macro situation, considering environmental conditions and facilities, until you reach a micro analysis, where are observed individuals and the activities performed by them. This instrument was structured on the parameters: Description of the standard, identify whether the health service includes or not the norm, it is appropriate or not and observation reports, as example in Table 1.

Table 1. Checklist model developed for Ergonomic Work Analysis

CHECKLIST: MINIMUM SECURITY CONDITIONS					
SAFETY ITEM	EXIST		APPROPRIATE		OBSERVATIONS
	Yes	No	Yes	No	
STANDARD/ RECOMMENDATION					

b) Checklist application

The application of the checklist was made from the workplace visit to be analyzed. Using the tool, the sterilization of materials area was analyzed and processes, observing all the items listed in the checklist. In case of disagreement, we recommend the use of images recording, since the picture can best illustrate the problem with a view to solutions.

c) Improvement suggestions

The second part of the checklist is the completion of the action plan for correction of items completed as non-existent or inadequate in the first part of the checklist. In this step, we describe all items that need attention/ improvements according to the checklist.

In the first column of the action plan work sheet, repeated every non-conforming items displayed on the checklist. They will not be added items that were considered accordingly, i.e., those who met the minimum safety and health conditions in the work environment.

The second column of the work sheet entitled "HOW?" is filled with one or more suggestion corrective measure for the item; briefly, but allows for easy understanding by managers and workers. Whereas each item listed will have a person responsible for its implementation, the name responsible for improving or fitness must be completed in the third column, where it named "WHO?".

In the fourth column entitled "WHY?" the items of the standards are identified, which determine the need for resolution of non-compliance.

The last two columns identify the cost of the deployment of patches and the deadline for the elimination of non-compliance, respectively, as shown in Table 2.

Table 2. Structure of the Action Plan

ACTION PLAN: MINIMUM SECURITY CONDITIONS					
SAFETY ITEM	HOW?	WHO?	WHY?	HOW MUCH?	WHEN?

Information relating to the technical area, columns entitled "HOW?" and "WHY?" were answered by the analyst who applied the checklist. Finished the development of the Action Plan was scheduled meeting with the coordination of primary care, Head of Unit and professional involved in the sterilization process to expose the points identified as not complying, doing a detailed explanation of each item for a full understanding of all gifts. Were listed priorities for the resolution of nonconformities considering the risks to health and safety of workers, demarcated by the workers through Likert scale of 1 to 10 points, in which 1-3 is low priority, 4-6, priority execution is average; Finally, from 7 to 10, high priority. This priority score was exhibit in column WHEN?

The completion of the "WHO?" and "HOW MUCH ? columns are the responsibility of the managers involved in this process, and should be considered the priority provisions by the analyst.

3. RESULTS

Whereas the demand analysis is the first step towards the realization of the EWA, the researcher contacted with the Basic Care Coordination of the municipality, ex-

plained the proposal of EWA to be held in a Basic Health Unit, suggested by the municipality, which appointed two professionals involved in the reprocessing of materials to accompany the activities.

Secondly was held visit to the Basic Health Unit to present the proposal of EWA in the sterilization area to service professionals, recognition of the physical area and scheduled follow-up of professional activities in the sterilization department.

In the monitoring "*in loco*" of the sterilization process the experienced information was recorded on a "field diary". It was noticed that the Basic Health Unit does not have a central supply and central sterilization, as it performs the processing of health care products in a decentralized manner, by different professionals and several places of the Basic Health Unit.

Cleaning and preparation of products for the health happens in the rooms where they were used, such as dental office and procedure rooms. After, being wrapped and only sometimes identified, the materials are taken to another room, the autoclave's room, the place where it processes the sterilization of materials used by different customers, comprising this led by Dentistry assistant. The autoclave's room is the access for cleaning professionals to move to the area outside the Basic Health Unit. Therefore, after the sterilization, the materials are distributed and stored in the consumer units (medical and dental offices and rooms procedures); this flow is characterized as multidirectional.

During the monitoring period, it was not possible to see the realization of physical tests, chemical and biological concurrently for validation of the sterilization process, or the record thereof. All this information was guided by law arranged in the CDR 15[5].

Based on the CDR 15[5] it was possible to make a checklist to identify the existing conformities and non-conformities in the processing of health products. This checklist covers the following categories: definitions, organizational conditions of best practices for the processing of health products; responsibilities of directors, technical managers, nursing and other services; human resources; health and safety at work; assignments; equipment; infrastructure; reception available to health products; cleaning processes of health products; sterilization; monitoring the sterilization process; storage and transportation[5].

The construction of the checklist and its application, enabled the group discussion about each item that the standard features, a situation that proved to be very positive and helped the reflection of professionals about the possible changes both physical structure, such as work process to ensure safety and health of workers and users of health service.

We developed a form for the submission of an action plan for adaptation of the items filled as non-existent or inadequate in the first part of this evaluation instrument, which were described all the items you need in accordance with the rules of improvements.

Finally, it was organized a moment called "*moments of knowledge*": professionals reflected on the possibilities for improvements, ideas formulated and organized filling out this form, which was consolidated in the action plan and submitted to the Municipality Health Secretariat for consideration and implementation.

This action plan only addressed the items that did not comply and was about the implementation of a centralized material and sterilization place containing reception area and purge, preparation and packaging, sterilization, storage and distribution of products and area records. Intend to deploy the MSC in restricted area, where there is less number of people circulating. Implementation of the record book of sterilization and labeling process, with complete data to enable the tracking of materials, standardization of surgical grade, paper wrappers prioritizing and Municipality Health Secretariat nonwoven. Review and implementation manual of technical standards, considering the in-service education for training of health professionals involved in the sterilization process.

The record book must include the faithful record of all sterilization steps, especially: date, equipment and sterilization batch of processed material number, physical, result of physical, chemical and biological tests, and recommended the filing of these records by at least five years.

With regard to human resources is suggested, which set internally professionals performing the sterilization process. Check annually if professionals are in active record in its class council, keeping own record. Check annually if professionals are in active record in its class council, keeping own record. Keep visible record in the Basic Health Unit/ MSC of the certificate of Technical Responsibility and check validity of the certification annually. Holding each year professional development and develop continuing education plan for employees.

Safety and health at work heading propose to resumption of guidance on the use of PPE (Personal Protective Equipment), and registry of PPE provided, and the orientation of its use. Supervise the use of PPE and keep record of adherence or not the employee, taking appropriate measures in case of non-compliance.

Due to absence of standardization that can guide workers about processing health products, we recommend the development of Technical Standards Manual Sterilization Process, which shall include the professional tasks and responsibilities of the MSC workers, to be used the training of new employees and for consultation during the activities in this unit. Among the tasks, there is the record of the products received in the MSC, sterilized and released to consumer units.

In line equipment is recommended: request report

about installing the equipment, the original parameters of manufacturing and current parameters for evidence of no change thereof; arrange the acquisition of reader biological indicator and sealing; develop annual scale calibration and provide the calibration by qualified service annually record keeping; organize the annual scheduled maintenance and record keeping; arrange the acquisition of biological indicator incubator.

The infrastructure item requires orientation of service professionals to perform technical barrier, physical barrier between soiled area and clean area, stand for materials conference, containers for waste disposal (cutting and perforating biological), equipment to transport the products, shelves or wired baskets and centralized, exclusive place for the storage of processed products.

With regard receipt of the products on the MSC, should be performed conference and registration of all incoming products. It is recommended to continuing education and standardizes the form of cleaning and rinsing of the products; provide quality examination of the water used in the processing of health materials annually and deploy biological control cleaning keeping track of the results; perform visual inspection after cleaning and prior to packaging. In case of soiling, restart the cleaning process. In the default presence in the product communicate the responsible technician to take action.

Acquire only wrappers settled by the National Health Surveillance Agency for use in sterilization. Acquire heat sealing and train professionals to use. Standardize labeling items: product name; batch and equipment; date of sterilization and date, name of person responsible for preparation, data that enable the tracking of product.

Sterilization heading collect the equipment called "Hothouses" the Basic Health Unit that are not used as method of sterilization. Make Bowie & Dick test on the first day of the cycle and maintain weekly in the minutes book; check the water potability as the autoclave manufacturer's recommendations annually and maintain records.

For the monitoring line of the sterilization process, it is recommended monitoring with chemical integrators (classes 5 or 6) once a month and record results in the record book; Monitoring of physical and chemical indicators to each sterilization cycle and in the record book; Monitoring with biological indicator at least once a week keeping track. Make reading the biological indicator and only release the load for use when the test is negative. In case of a positive test, seek review of the equipment and redo the sterilization process keeping in the record book. File a result of physical, chemical and biological tests for five years as stipulated in the current legislation.

Considering the storage, sterile products should remain *in situ* for this purpose until the time of dispensing for consumer units. Perform transport of health products in a closed container and identified dirty material and another identified as sterilized material.

4. DISCUSSION

The literature[6,10,11] signals the need to maintain a unidirectional flow of material. And yet, it is recommended that there is a barrier between the soiled area and clean area, and whenever possible other barrier between the area clean and sterile area[11].

The MSC is responsible for receiving unit, purging and cleaning, preparation, sterilization, storage and distribution of sterile or non-sterile materials, units of services providing care for the patient. This place facilitates the control and standardization of the nursing staff techniques regarding the preparation and cleaning, ensuring the quality of the material used[12].

The reception area and purge is characterized as an area for reception, conference, cleaning and separation of contaminated materials from consumer units[13]. It is one of the most contaminated workplace in the MSC, the diversity of materials soiled with secretions [14].

The materials staging area includes the reception activities of material from a purge; drying the material; visual inspection of the articles; verification of integrity, operation manual lubrication thereof; separation and replacement of non-conforming items for evaluation and conduct; spare and replacement of parts required; assembly, packaging and labeling of packages[15]. The packages already closed must be identified during the preparation of the package containing the worker's name, the type of article and the processing date[16].

The sterilization area of materials intended for sterilization of materials after preparation[17-18]. This area must have biological indicators of incubators and system for custody of the records of the sterilization process monitoring should be performed daily with chemical and physical indicators, following routine defined by the MSC[17].

The area of storage and distribution aims to centralize all processed and sterilized articles to their subsequent distribution to the consumer units should be a restricted area access and exclusive use[14].

Sterilized products should be stored in clean, dry area under protection from direct sunlight and subject to minimal manipulation. One should be careful not to allow, at the time of distribution, the crossing of sterile items with non-sterile items[17].

For nurses who work in the MSC, unit management is its main activity involves the planning issues, development of administrative and operational instruments, with the supervision and decision making, essential elements for quality of care[18].

According to the 421 Resolution of Federal Nursing Council, of February 15, 2012, is among the nursing assignments participate in the development of Standard

Operating Procedure (SOP) for the processing steps of health products, available to employees for consultation, should also participate in the monitoring and control of cleaning and disinfection or sterilization steps. It is MSC nurse's responsibility to propose and use quality control indicators processing health products, monitor and document the qualification of technical visits and the operation of the MSC equipment performance, or processing company health products[19].

Should ensure the use of PPE, according to the MSC workplace, develop terms of reference, or submit the technical report on the acquisition of health products, equipment and supplies to be used, and update continuously on technological innovations related to the processing of health products[9].

Nurses are responsible within the MSC coordination of work processes and the tasks of passing records of the period. In addition, nurses are responsible to the guiding questions about the routine work in the MSC, supervising the activities in each area[20], preparation of daily scale work, development and programming skills and training, further of the participation of purchases of materials and supplies for the unit, assessment and forecasting of the stock of materials consumed[21].

The nursing technician assignments are related to receive the material from other industries, check, wash, dry and pack these instruments, identifying correctly[22]. Furthermore, it is for that professional conduct records, prepare loads for sterilization, sterilize materials and store them appropriately. Make incubation and reading of indicators, the removal of materials with the term of the losers sterilization and the completion of the Bowie-Dick test, daily[22].

As regards the envelopes, studies indicate that should allow the entry and exit of air and sterilizing agent and prevents the entry of microorganisms and should be regulated by the National Health Surveillance Agency, for specific use in sterilization[5,14,23].

About the recommended tests, for validation of the sterilization process are chemical and biological, testing and maintenance of equipment and records the sterilization process (physical indicator). The chemical tests indicate whether there was a potential failure in the sterilization process by means of changing its color[24]. The biological tests consider all sterilization parameters, are used and monitors critical parameters, such as temperature, pressure and time exposure, improving the safety of the materials[24].

In the records must contain the name of the material, sterilization type, batch and validity of the product and responsible for packaging material. Each sterilization cycle must be conducted registration with the lot, its contents, the sterilization time and the temperature reached by the equipment. Must be registered the name of the operator, the results of biological and chemical tests, and any complications that happened during the sterilization process[25].

Workers of materials sterilization area are exposed to risks, including, can highlight the risks related to the handling of chemicals, work with biological agents, fire, explosion and electric shock. The complexity of this workplace involves products and techniques constantly changing making it necessary to adapt to the EWA legislation and above all, to make the workplace healthier and organization of work.

5. CONCLUSION

There has been a concern of regulators in health and other institutions the minimum safety conditions both for professionals and for the population served by primary care services with regard to the sterilization process.

Considering the importance of the one-way flow of materials, standardization of forms of cleaning and packaging, sterilization type, process validation testing and adequate recording, this Ergonomic Work Analysis for technical standard deployment will provide the basis for new employees training, assisting primary health care services to standardize said process minimizing public costs wrapped in reprocessing dental, medical and hospital supplies, ensuring better health quality users of the Unified Health System and security workers.

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THE CONSUMPTION OF ALCOHOLIC DRINKS BY UNGRADUATED STUDENTS OF PSYCHOLOGY FROM FACULTY PRESIDENT ANTÔNIO CARLOS IN IPATINGA, MG, BRAZIL

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ABSTRACT

This article covers the consumption of alcoholic drinks by ungraduated students of Psychology from Faculty President Antônio Carlos in Ipatinga, MG, Brazil, through a questionnaire, and bibliographical research. Were invited the ungraduated students of psychology from the Campus of Ipatinga, MG to answer an interview. First, covers the consumption of alcohol throughout history; at the second timing, our study aimed to understand the neurological and pharmacological changes in consumption of alcohol in the human body and the use of psychotherapy, in order to understand its consumption, according to the phenomenological-existential vision. On the third time measuring alcohol consumption by students in psychology through the result of field research.

KEYWORDS: Ungraduated students, psychology, alcohol.

1. INTRODUCTION

The ingestion of psychotropic substances is an ancient custom that accompanies humanity. Although the recreational or ceremonial use of these substances is commonplace in many cultures, binge drinking and alcohol dependence is a serious and growing global difficulty. The fact that a drug like alcohol is sold and consumed on a large scale, due to different factors: particularly the cultural and historical origin. In Western countries, the use of alcohol is present in nearly all cultures and was in many cases considered "*divine drink*" or also a drug[1].

It is essential to understand the mechanisms of action, acute and chronic effects, as well as its reinforcing and dependence-inducing properties that repeated consumption of alcohol can lead to the individual, generating damage to himself, his family and social relations, in addition to an overvaluation of the alcohol use, conditions associated with this use and serious organic consequences[2].

The work done by psychotherapist guided by the existential-phenomenological principles with individuals who demonstrate drug addiction, admitting or not your condition in the world, will be based on the reality presented by the person seeking help, accepting it, within their means[1].

In this relationship of trust and complicity that is being formed, it is indispensable to understanding of being that is revealed and that is before the desperate lack of self. It is then let off this relationship anything that might hurt the basic premise is to see man as a being devoid of sense and that it is this make sense to own every moment of your existence[1].

Our aim was to tabulate, through field research, the consumption of alcoholic drinks by 181 psychology students of the Faculty President Antonio Carlos Ipatinga (UNIPAC). The article was prepared by the need to understand how the psychology students react when faced with issues that vision measuring consumption and dependence on alcohol and distillates, are considering taking a course that fits like health.

It is necessary to understand whether the graduates perceive and dosage the drinking used for them, how many times a week and what kind of substance is most commonly used; these information are often not perceived or are neglected by those who make excessive consumption of drinks.

2. MATERIAL AND MÉTHODS

A semi-structured interview was conducted with a group of Psychology undergraduate students, from Faculty President Antonio Carlos, of both genders, with diverse ages, and diverse periods of the psychology course. The interview consisted of five multiple choice questions, and four open questions, where graduate students could discuss the issue addressed.

Using the statistics

As the statistics a multidisciplinary science, can be used by chemists, agronomists, psychologists and a huge variety of professionals and their fields of study. It is a branch of science that allows us to measure data through statistical analysis. According to Armando Cavanha apud Marcelino (. 2014, p 02), the statistical comprises:

- The collection, presentation and characterization of information in order to assist data analysis and decision-making;
- The descriptive statistics involves the collection, analysis and presentation of a set of information to describe the various features of this dataset;
- The Inferential statistics methods consists of estimates of a population based on studies of samples;
- The population is the totality of items under consideration. The sample is of the population being considered for analysis. The finite population is one that has a quantitative limit as the infinite refers to quantitative without limit.

DEVELOPMENT - LOCAL FINDINGS

Consumption of alcoholic drinks in world history

To understand the use of alcohol by students is necessary to understand the beginnings of its consumption in the world, its cultural respect, social. The alcohol consumption is a behavior adjusted to most cultures. Its consumption is associated with celebrations, business and social situations, religious ceremonies and cultural events[2].

Prado (2012)[3] points out that, "*since these distant and rudimentary ways of producing drinks, they have fulfilled a key role in building the world, to serve as identity markers and limits of social inclusion/ exclusion* ". This is evident from its ritual role in the transition from work to leisure to the construction of social labellers (for example, knowledge of wines as an indicator of social excellent). The drink or drink`s brand to be consumed defines the social stratum to which the person belongs.

Since ancient times, the rudimentary alcohol was an elite product, taken by the Sumerians aristocrats with gold straws. However, over time the drink`s fermentation and alcoholic production levels varying the people arrive. Each of the workers who built the pyramids of Giza in Egypt, won five liters of beer per day. At that time, she was considered so called "*liquid bread*" food for the workers. Therefore, the elite began to migrate to another type of alcoholic drink: wine[3].

Currently it is perceived that, with globalization the taste and consumption of diverse types of alcoholic drinks had a social change where it is no longer possible to say that certain type of drinks belongs to a coach. However, excessive use of alcohol causes not only losses in members, but neurological[3].

Group of Alcoholics Anonymous

Excessive consumption of alcohol has become a social problem. There are countless individuals who have sought help to address this problem, but they are still few in relation to existing alcoholics numbers. From the desire to stop drinking alcohol, individuals refer to ways that can bring an attempt to physical and / or mental improvement[4].

In this context arises the group of Alcoholics Anonymous (AA), a fellowship of men and women who have a desire to stop drinking, and thus share their experiences with each other in order to help themselves. Usually, the person doing the excessive consumption of alcoholic substances receives different labels and due to behavior that does not fit in that social environment, they are put aside, the margin.

The AA group regard alcoholism as a physical, moral and spiritual disease, titling his cock as "alcoholic patient in recovery," and not stigmatizing as "drunken".

Thence, the reported experiences come from a neighboring moment when the person realizes that they are committed to alcohol and that their personal values often are fragmented and / or lost[4].

Neurological changes caused by excessive consumption of alcohol

Neuropsychological studies indicate cognitive, behavioral and emotional changes, but the quality of mental functioning in alcoholic subjects, which provide important information for a better understanding of brain function. Many studies point to deficits in executive functions, which refers to a set of mental functions responsible for information processing that integrated, give the conditions of interpretation, behavior, communication and relationship with yourself, the world and other people[5].

Can be defined as the daily problems solving skills in general. Losses in these functions generate behavioral changes. There may also be losses in spatial vision and psychomotor speed skills and likewise in walking and

balance[5].

Alcohol is the substance most frequently mentioned in relation to risk behaviors due to effects on behavior apparently is involved in the violence that occurs under the effect of use. The direct and most common relationship between alcohol and aggression is by poisoning. Research indicates that the mechanisms that explain how alcohol induces aggression are through lack of fear inhibition by the anxiolytic action. Namely, alcohol can affect cognitive function such that decreases in the individual's ability to plan actions in response to threatening situations[6].

Alcohol may increase the perception of pain, which may be a cause of greater defensive aggression, the individual can hardly tolerate aggression and promptly to the fray. Also can serve as a trigger to demonstrate acts of aggression for those who really have a propensity towards violence and when they are exposed to vulnerable situations. For example, it has been reported that people who have a greater predisposition to being aggressive, tend to have higher levels of aggression when using alcohol, compared to those which also exhibit high levels of aggression, but do not drink[6].

In research programs for decades, noted that alcoholics show deficits in tests of learning, memory, abstraction, problem solving, analysis and perceptual synthesis, speed and efficiency in processing information. His studies indicate a continuum of neurocognitive deficits ranging from more serious patients to those with moderate or mild deficits in those with more moderate alcohol intake[5].

The performance of subjects with moderate alcohol consumption on neuropsychological tasks and different aspects of attention. In comparison with these non-alcoholics, individuals with moderate intake had significant losses in all neuropsychological tasks in divided attention and inhibition test stimuli (Stroop). However, showed normal performance test that measures selective attention[5].

Pharmacological changes caused by excessive consumption of alcohol

Although it is classified as a drug CNS depressant activity (central nervous system) effects of alcohol can be considered biphasic. This is because, when given in high doses, dominated the depressant effects, whereas at low doses, or in the first moments after the administration of high doses, ethanol can produce stimulating effect of CNS activity[7].

The recurrent use of substances causes the body to change its normal operation, generating within the body adjustments to the presence of the substance in the various systems with which the drug interacts. Liver enzymes involved in its metabolism are affected. When this adjustment process leads to a reduction in the initial effect of the drug, it is understood that there was a process of tolerance, characterized by the reduction of certain effects of the drug in the body. It is important to remember that does not develop tolerance to all effects of the drug. In the case of alcohol, is common observation of tolerance to the depressant effects[7].

For a drug to be able to induce dependency, it is fundamental that it has reinforcing properties, i.e. which is capable of sustaining and increasing the chance of occurrence of previous behaviors, and for the use of the drug.

According to the World Health Organization (WHO), the syndrome of alcohol dependence can be defined as "*A set of physiological, behavioral and cognitive phenomena in which the use of the substance reaches a much higher priority for a given individual than other behaviors that before had more value. A central descriptive characteristic of the dependence syndrome is the desire, often strong, sometimes irresistible, to consume alcohol*"[7].

It is considered that strengthening not only leads to good feelings, but also to relieve unpleasant feelings. Behavior of the maintenance should be analyzed consume the substances taking into account that the individual seeks not feel unpleasant sensations of the effect of withdrawal syndrome, which is characterized according to Almeida (2006)[7] by: increased levels of anxiety, hand tremors, fever, sweating, hyperexcitability, with increased sensitivity to sound and visual stimuli, and, in severe cases, delusions and hallucinations.

Pracz *et al*. (2010)[5] asserts that the physical addiction alcohol is demonstrated by the withdrawal syndrome when alcohol consumption is stopped: in the Autonomic Nervous System their symptoms are presented by tachycardia, hypertension, sweating, fever, chills. Behavior manifests itself through anxiety, depressed mood, restlessness, irritability, agitation, hallucinations, paranoid delusions, illusions. The loss of cognitive functions are manifested in the form of distraction lack of concentration, memory and judgment, temporo-spatial disorientation, sensory turbidity, fluctuating course. In the gastrointestinal tract presents occasionally as anorexia, nausea and vomiting, diarrhea. Neurological sequelae: weakness, cramps, tremors, convulsions. Sleep disorders: insomnia, nightmares.

With respect to pharmacology, there are few reports about specific drugs for alcoholics, considering the therapeutic quest, is mostly related to the effect of alcohol causes the body[7].

The psychodiagnosis based on phenomenology and existential

It is noticed that the consumption of psychoactive substances by humans will exhibit specific values and symbolism that will change as the cultural historical

context. Therefore, man makes use of intoxicating substances to modify and/ or change their perception and mood, resulting, in most cases, a change in behavior[6].

Based on the philosophy of Kierkegaard, despair is the feeling that man experiences throughout their existence when faced with situations such as dialectical possibility/ need, finite/ infinite, temporal/ eternal, these situations that are impossible to be solved, but can be experienced from the synthesis. It is this reflection on this historical dialectic: does the use of the drug appears in man as an attempt to resolve the paradoxes that their existence offers? There is a relentless pursuit to achieve all possible: infinity, immortality, and thus not be confronted with the need, the finite and the temporal, or vice versa. Thus, the drug may be a strategy that man uses to try to resolve these paradoxes[1].

When the individual denies its dependence reveals an obscuring of his conscience, why can not examine your own condition of existence in the world. According to Lessa (2010)[2]: "*The goal of psychotherapy in an existential-phenomenological perspective is to provide self-knowledge of man, which will be given based on the statement of responsibility for the construction of his own existence and thus to assume that want to be in every moment of your life*".

It is known that men should not exceed the consumption of three daily doses and women, two daily doses; for both sexes, it is not recommended to ingest this drug for two days a week; and, in some instances, the use of alcohol is not recommended even in small quantities. The dose depends on the type of beverage, while a dose equivalent to approximately 340 ml beer, 140 ml of table wine, 85 ml of port wine or liquors, 30 ml of whiskey, and 40 ml of vodka or rum[8].

Reality of our population group

Figure 01 represents the total number of respondents (N = 181), where it was found that most of the respondents are women (N = 152) in the number of men (N = 29) interviewees.

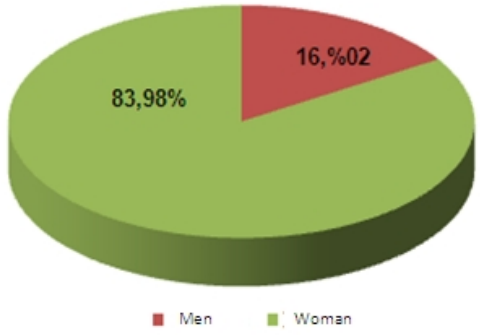

Figure 1. Population distribution, related to gender interviewed in population group considered.

In Figure 02 it is possible to see that of the 181 interviewees, the predominant group aged 21 to 30 years (N = 99), followed by those who have less than 20 years of age (N = 38); between 31 and 40 years (N = 25); between 41 and 50 years (N = 12) and less than 51 years (N = 5). Not inform their age 2 interviewees.

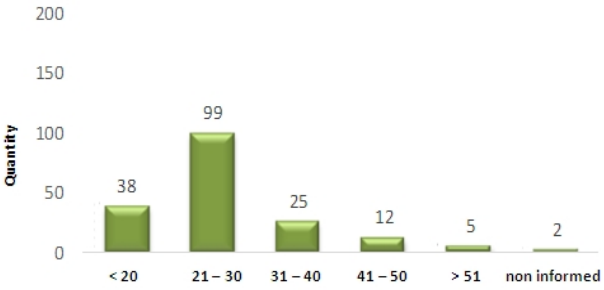

Figure 2. Population distribution, related to the age group of the respondents in the population group considered.

In this population, 112 individuals have a monthly income between 01 and 02 minimum wages, followed by 29 respondents who have monthly income between 3:04 minimum wages; 11 respondents who have income between 5:06 minimum wages; 05 respondents have a monthly income of less than 01 minimum wage. Only 06 interviewees have an income higher than 07 minimum wages per month (Figure 3).

Figure 3. Population distribution, related to monthly income* of respondents in the population group considered. * Concerning the number of minimum wages of Brazil (1 minimum wage = R$ 724,00).

In the interviewed group, 39.23% (N=71) said that the consumption of alcoholic beverages, while 60.77% stated not to use alcohol. Considering the group of respondents who reported alcohol consumption, (N = 71), 61 of them said they consumed beer, 49 reported make consumer spirits, and only 14 of the 71 respondents said consume other types of beverages such as wine (Figure 4).

Weekly consumption in cups only 06 of respondents said consume less than a cup, 20 interviewees reported consuming up to 05 cups, 11 of the respondents reveal consume up to 10 cups, gathering the following answers of respondents say 11 consume more than 11 cups 30 cups, 02 reveal consume more than 30 glasses weekly and 21 of the respondents did not report. (Figure 5).

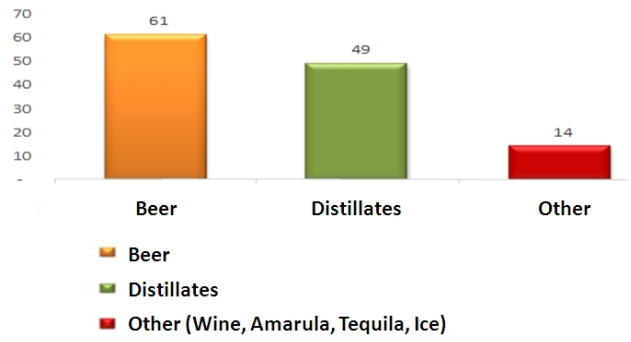

Figure 4. Distribution of the population, related to the type of drink consumed by respondents in the population group considered.

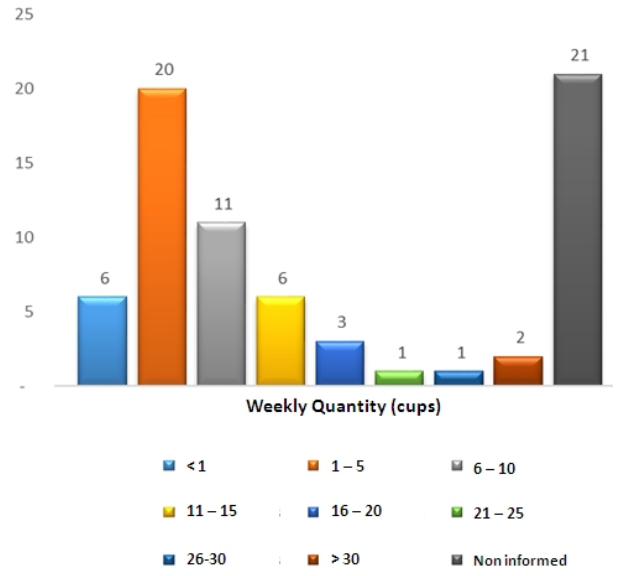

Figure 5. Population distribution, related to the frequency of consumption* by respondents in the population group considered. Estimated consumption cup of 200 mL.

3. CONCLUSION

The licit drug use in the daily life of people has permeated our cultural scene. In this context, the undergraduates participating in this consumption are, without realizing that alcohol is one of the most potent legal drugs, producing momentary pleasure, but ends up making the user dependent.

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OCCURRENCE OF SANFILIPPO SYNDROME IN TWO SISTERS

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ABSTRACT

This case report highlights a genetic disease, the Sanfilippo Syndrome type B, a genetic disorder characterized by an inborn error of metabolism. The incidence is around 1: 10,000 to 1: 25,000 newborns. The syndrome affects the central nervous system, having been reported its occurrence in two sisters.

KEYWORDS: Sanfilippo syndrome, autosomal recessive inheritance.

1. INTRODUCTION

The Sanfilippo syndrome type B (MPSIIIB) is a genetic disorder (17q25) characterized by an inborn error of metabolism caused due to deficiency of the enzyme a N-acetyl-glucosaminidase (NAGLU), affecting the processing of the glycosaminoglycan (GAG) heparan sulfate (HS)[1,2]. It was first described in 1963 by American pediatrician Dr. Sylvester Sanfilippo[2]. The incidence is around 1:10,000 to 1:25,000 newborns[3,4]. It originates from an autosomal recessive inheritance and has its clinical expression around 4 years of age, with progressive deterioration of cognitive skills, communication and behavioral[2,5]. It is a disease of permanent and progressive symptoms whose manifestations are multisystemic, affecting the central nervous system, skeletal, digestive, and often, the eye and the epithelial[2,5,6,7].

We carried out the report of this rare clinical case the of two sisters through a descriptive study. Data were collected from the medical records of patients, history, interviews with family members and caregivers. Both find themselves in therapeutic residence in an institution where some of the authors work.

For scientific technical background were searched the medical literature and health sites PubMed and Bireme between 1963 and 2014.

2. CASE REPORT

CASE 1 - Female, 36 years old, caucasian.

Assisted in Specialized Center institution Specialized Center Nossa Senhora D'Assunção since age 11. Dependent in ADL, uses wheelchair.

Absence of speech. Abnormal facial features. Dysostosis multiple. Restlessness, stereotyped hand movements, constant insomnia, oblivious to contact. Frowns, puts the tongue out of the mouth and makes faces all the time. Difficulty swallowing - uses thickener.

Medication used daily: Carbamazepine (400 mg), Pericyazine (10 mg), Clonazepam (1mg), Imipramine (25mg), Promethazine (50mg), Combiron (standard dose).

Diagnosis: Sanfilippo type B, Beta-thalassemia, Severe Mental Retardation, Epilepsy.

CASE 2 - Female, 27 years old, brunette.

Bone marrow transplantation was performed with 06 years old. Assisted in the institution Specialized Center Nossa Senhora D'Assunção since age 09.

Dependent in ADL, uses a wheelchair. Absence of speech. Dysostosis multiple. Restlessness, stereotyped hand movements. Sometimes addresses the look and features unmotivated laughter, screams and grimaces do all the time. Contact depleted. Difficulty swallowing - uses thickener.

Medication used daily: Neozine (25 mg), Haloperidol (2 mg), Clonazepam (2 mg), Tegretol (200 mg).

Diagnosis: Sanfilippo type B and Severe Mental Retardation.

In both cases, biochemical tests for the diagnosis were used to investigate the existence of enzyme deficiency. Radiological exams were also used for documentation of the case and composition of dignóstico (data not shown).

3. DISCUSSION

For the cases in question, both patients had development within the normal range with respect to sitting, crawling and walking. The speech has not been developed. They have medium height, although long bones and dorsal kyphosis. The losses in sphincters controls and gait started at around 05 years of age. The loss of ambulation happened gradually and before use of the wheelchair the march was true of the hip and knees bent. In both cases the use of the wheelchair occurred after 25 years.

Currently both have severe cognitive impairment affecting mainly the contact with the environment, with a deep alienation framework[6,7,8]. The syndrome causes significant neurological symptoms, including severe intellectual disabilities; the Intelligence Quotient may be less than 50. Symptoms appear more severe in people with Sanfilippo syndrome type A and yet there is no cure for individuals affected by any type of MPS III[6,7,8].

The Patient of Case 1 evolves with late-onset seizures culminating in increased use of anticonvulsants. Although studies and efforts in therapy, using transplants fibroblasts, bone marrow transplantation and enzyme replacement therapy, neither method is effective in remission of symptoms in order to prevent disease progression.

In the case of Patient Case 2, it is believed that the bone marrow transplant prevented the development of beta-thalassemia.

Both are under the care of a multidisciplinary team of professionals psychiatry, neurology, internal medicine, physical therapy, nursing, speech therapy, psychology, pharmacy and pedagogy. The performance of this team in the direct care and guidance of caregivers and family enables more effective control of the clinical variables culminating in improving the quality of life of patients as well as longevity of the cases, which according to medical literature, generally progresses with deaths in adolescence.

4. CONCLUSION

Based on the documentation of cases and literature data the authors concluded the diagnosis of Sanfilippo syndrome type B (MPSIIIB). In Case 2, it is believed that the bone marrow transplant prevented the development of beta-thalassemia. Scientists who study MPS III continue to search for better and more effective ways to treat them.

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IATROGENIC MANDIBULAR FRACTURE ASSOCIATED WITH THIRD MOLAR REMOVAL: CASES REPORT

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ABSTRACT

Surgery for removal of impacted teeth is a procedure commonly performed by dentists and specialists in oral and maxillofacial surgery and has, among the possible accidents and complications, the risk of immediate or late mandibular fracture. The fracture of the mandibular angle associated with the removal of the third molar is a rare and serious complication. Usually occurs due to inadequate surgical planning and execution, as technical and instrumental inappropriate and excessive use of force during the dislocation of the tooth. Local factors such as the degree of inclusion, presence of previous infection, the angle and volume of the tooth, as well as the age and physiological condition of the patient are important factors in the occurrence of these fractures. This article reports two cases of patients with jaw fractures caused by removal of third molar and covers techniques that could be used to minimize the risk of fracture, as well as discusses the bone fixation protocol in these fractures.

KEYWORDS: Third molar, internal fracture fixation, mandible.

1. INTRODUCTION

The removal of impacted teeth is a workaday procedure in the practice of Dentistry and is associated with various surgical risks, such as the inferior alveolar nerve injury, fracture of adjacent teeth, bleeding, alveolitis, infections and bone fractures[1].

According to the literature, the mandible fracture incidence resulting from removal of third molar is less than 0.1%. However, its risk increases when involve large ostectomies in previous local infection (pericoronitis), long and divergent roots, patients with advanced age and, when there lack of surgeon's skill[2].

Fractures can occur during surgery (immediate) or post-operative period (late)[3]. When immediate, are usually caused by applying excessive force professional and patients typically report a sickening crack or a sudden and severe pain. In cases of late fractures occur in the first four weeks after the surgical procedure and are caused by local trauma or by masticatory loads[2].

Signs and symptoms in those fractures are pain, swelling, limited mouth opening, dysgeusia, bone rung on the edge of the jaw, trismus, the inferior alveolar nerve hypoesthesia and drainage of secretions. The diagnosis is made by imaging exam, such as panoramic radiography and computed tomography[1].

Bodner *et al.* (2011)[5] conducted a systematic review of 44 articles and 189 mandibular fractures associated with the removal of teeth included. There was a predominance of males (2.2: 1), age ranging between the second and eighth decades of life; the highest incidence occurred in the fifth decade. Regarding the angulation of the tooth when cited, 37% were in vertical position; 26% of the teeth were in a horizontal position; 24% of the teeth were mesio-angulated; 13% were of disto-angulated. On the state of inclusion, 52% of the teeth were fully included.

Ethunandan *et al.* (2012)[3], also held a systematic review evaluating 18 articles and 130 cases of fractures related to the removal of third molars included. In yours study, there was predominance of males (2.4: 1); age it varied between 19 to 79 years, with a peak of incidence between 36 and 60 years. The fractures occurred more frequently in mesio-angled teeth (32.6%) and the degree of inclusion, 72% of the teeth were fully included. Regarding the moment of fracture, there was a higher incidence in the late fractures as compared to immediate fractures (2.7: 1). Finally, as regards the classification of Pell and Gregory, classes II/ III and Type B/ C were the most common.

The treatment of these fractures is to restore the dental occlusion and all the physiological temporomandibu-

lar functions through conservative or surgical procedures, depending on the severity of the case[6].

2. CASE REPORT

CASE 1.

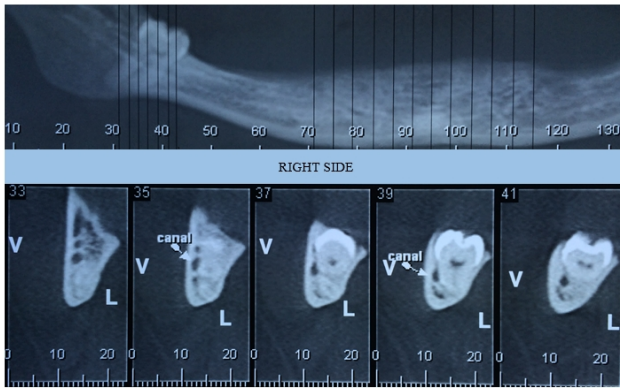

Figure 1. Pre-extraction cone beam TC: observe intimate relationship between the tooth and the alveolar canal, and reduced bone volume around the third molar. Canal: alveolar canal.

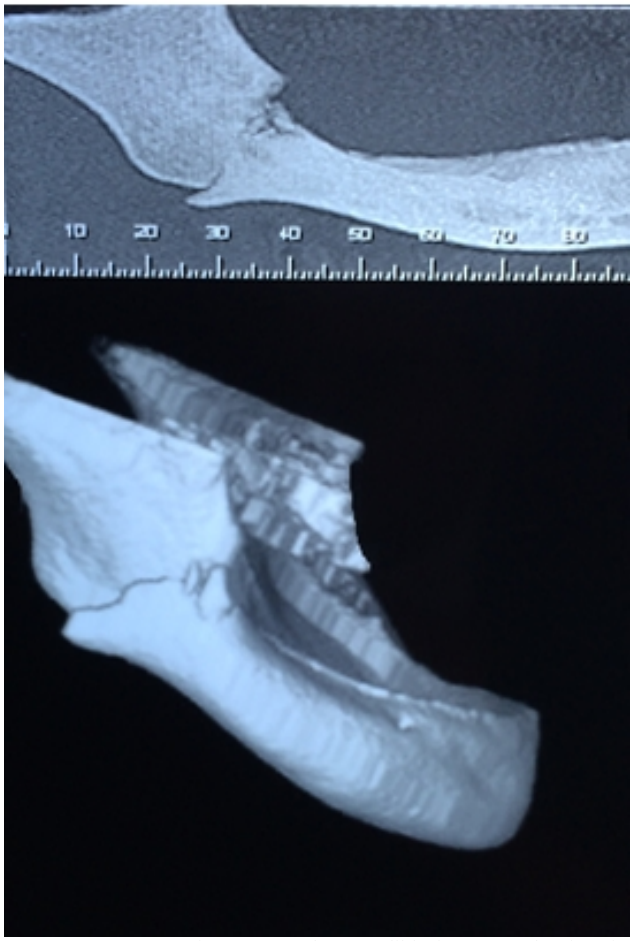

Figure 2. Post-extraction tomography. Mandible fracture at the site of removal of impacted tooth.

Female patient (42 years old), presenting situation of pain, swelling and bone crackle in right mandible; reported that a week ago had been referred to the tooth removal included.

Requested to preoperative CT jaw, where it was observed the presence of lower right third molar included with divergent roots and in close relation to the inferior alveolar nerve and the basilar of the mandible (Figure 1).

A new CT scan was requested and found mandibular angle fracture law, in the region of surgery performed to remove the impacted tooth (Figure 2).

When asked, the patient reported that the surgeon had used a forceps for removal of said tooth. Faced with this situation, was planned surgical procedure for treatment of fracture in the hospital under general anesthesia. The procedure consisted of headgear access (Risdon access), dilatation of soft tissues, fracture reduction, reconstruction using bone fixation plate/ screws 2.4 mm in the compression zone and plate/ screws2.0 mm in the mandible zone of tension (Figures 3 and 4), followed by suturing anatomical planes.

Figure 3. Extra-oral surgical access and exposure of the fracture.

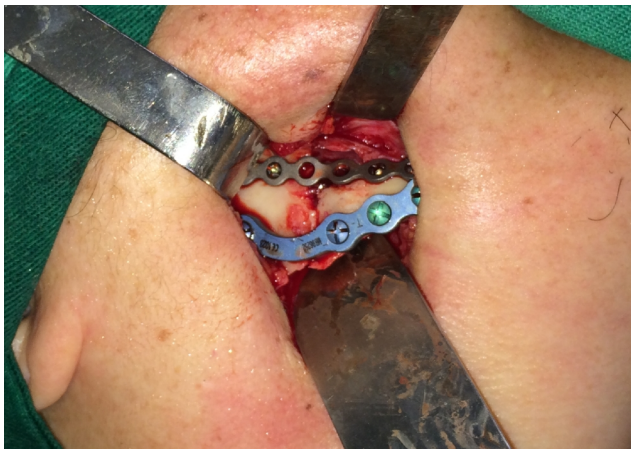

Figure 4. Reduction and bone fracture fixation.

The patient returned to the clinic for clinical and radiographic follow-up, doing well, no complaints and/ or complications, good reduction and bone fixation in follow-up 1 year and 6 months (Figure 5).

Figure 5. Radiography post-operative control.

CASE 2

Female patient (31 years old), with trismus and pain in angular region of the right mandible. The patient claimed that ten days ago had been referred to the removal of an impacted tooth. The pre-extraction panoramic radiograph revealed the element 48 included in a vertical position (Figure 6).

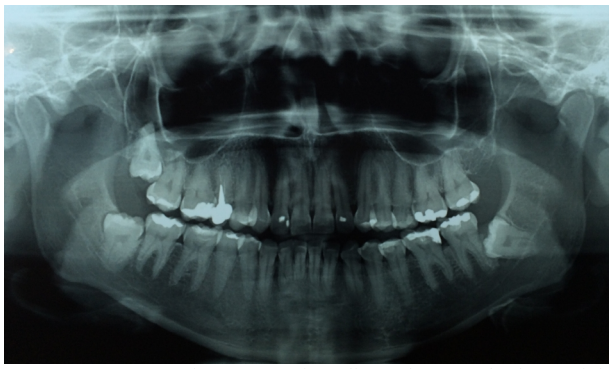

Figure 6. Pre-extraction panoramic radiograph: Note the lower right third molar included in a vertical position.

A post-extraction panoramic radiograph was requested; was observed a angle mandibular right fracture in the tooth removed area (Figure 7). Treatment consisted of extra-oral access (Risdon access), dilatation of the soft tissues (Figure 8), trans-operative intermaxillary block, fracture reduction and bone fixation using plates/ screws - system 2.0mm *locking*in to compression and tension zones of the jaw (Figure 9), followed by suture of the anatomical planes.

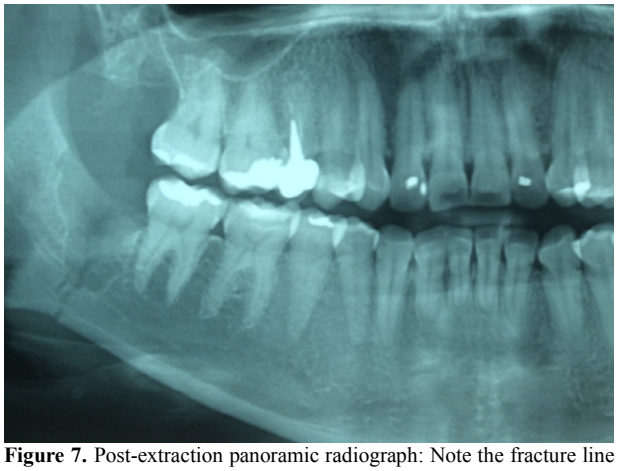

Figure 7. Post-extraction panoramic radiograph: Note the fracture line in the region where the included tooth was removed.

The patient had no complaints and/or incidents, with a good dental occlusion, documented by clinical and radiographic follow-up of 6 months (Figure 10).

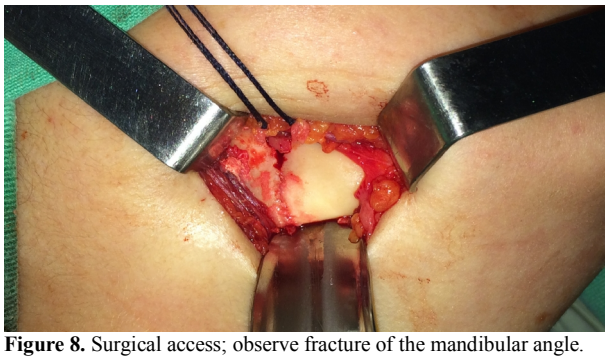

Figure 8. Surgical access; observe fracture of the mandibular angle.

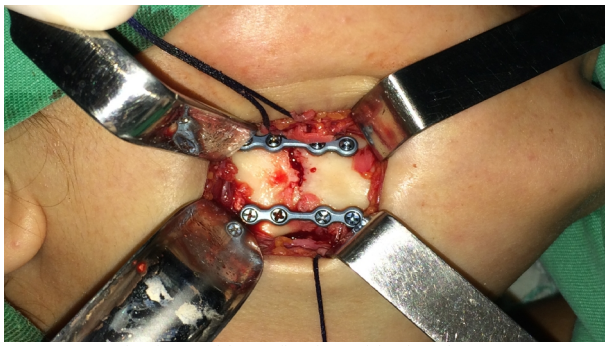

Figure 9. Reduction and bone fixation with plates/ screws system 2.0 mm.

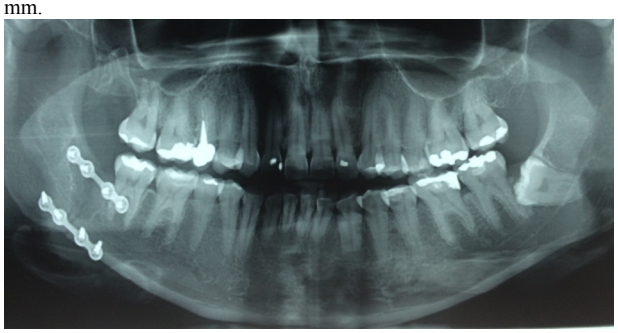

Figure 10. Postoperative panoramic radiograph.

3. DISCUSSION

Mandible fracture associated with extraction of third molars is a rare complication, with an incidence ranging from 0.0046 to 0.0075%[1]. The reason for the occurrence of these fractures is that these teeth occupy the space that should be filled by bone, resulting in bone fragility area. Another fact is that the angle of the jaw has a range of thinner bone tissue when compared to other areas of dental support. Therefore fracture occurs when the forces exceed incident bone strength, or the force applied to remove the tooth is greater than the force supported by the bone in the region[2,7].

It is important to identify high-risk patients, such as fully impacted teeth in vertical or horizontal position, long and divergent roots and intimate relationship with the mandibular basilar with little bone structure, tooth ankylosis, atrophic jaws, advanced age, with osteoporosis, and previous pericoronaritis associated pathological lesions, and formulate a comprehensive treatment plan that includes the choice of type of anesthesia (general or local), surgical technique, as an extension of bone removal, sectioning of the tooth and application of strength to tooth dislocation, minimizing the risk of fracture.

According to Wolff's law, after a tooth extraction, the alveolar bone loses its function being gradually resorbed over time and can result in severely resorbed jaw[8]. The life expectancy of Brazilians, in both genders, has been increasing, which also reflects a higher frequency of elderly patients with edentulous jaws severely absorbed with third molars that were not removed when young. Therefore, the maintenance of asymptomatic impacted teeth can cause in the future, major complications to elderly patients with edentulous jaws reabsorbed as pericoronaritis and increased risk of fractures, such as the first reported case.

The decrease in bone elasticity and healing capacity, risk of osteoporosis, bone atrophy, increased chances of tooth ankylosis, incidence of postoperative complications and diseases are factors that contribute to the increased risk of fractures in this age group[3]. In such cases, the separation of the roots and crown can minimize the risk of fractures[5].

A viable option for cases of teeth included in severely atrophic mandible at risk for the mandibular fractures is described by Sverzut *et al.* (2013)[9]. The authors reported a case of a woman (54 year old) whose jaw presented with severe bone resorption and had two impacted third molars. The proposed treatment involved the use of a *locking* reconstruction plate 2.4 mm, pre-molded from a prototype of the patient's mandible in order to prevent a mandible fracture during removal of the teeth. The surgical procedure was performed under general anesthesia for the installation of the jaw plate for intra-oral route, followed by removal of impacted teeth. Immediate or late mandibular fractures were not observed with a follw-up of 16 months. The concepts mentioned above could have solids applied in the first case described, considering the case of an elderly patient with, with an atrophic jaw, divergent roots and severe dental inclusion.

The literature is very controversial about the real need for the removal of asymptomatic impacted teeth. However, maintaining the teeth in those cases, can cause several problems to the patient in the future as the need for surgery while the elderly, resulting in increased risk of complications such as infections and fractures. The mere presence of this tooth already increases the risk of mandibular angle fracture, which can already justify the "prophylactic removal" of asymptomatic impacted teeth.

According to Bodner *et al.* (2011)[5], fully enclosed teeth have a greater risk of fracture because the amount of bone removed during surgery is greater. Moreover, patients with semi-enclosed tooth may have pericoronaritis predisposing fractures during removal of the tooth.

The second case showed a fully enclosed tooth, upright, but with a good amount of bone between the tooth apex and the foundation of the jaw and which at first glance would not present a high risk of mandibular fracture, which leads us to believe that the fracture can be caused by surgical technique failure.

A technique described in the literature which can be used in cases of high risk of mandibular fractures is coronectomia[10], described mainly for cases of high risk of damage to the inferior alveolar nerve, but can avoid mandibular fracture in surgery of teeth included at high risk of producing the mandibular fracture. Another technique that can be used in such cases is to perform a sagittal osteotomy of the mandibular branch for tooth removal[11].

Considering the possibility that fracture occur in the postoperative period, it is interesting guide patients to keep liquid and soft diet for 4 weeks after surgery and prevent the practice of contact sports. Also, from a legal point of view, it is essential to sign a free and informed consent by the patient, declaring to be aware of the risks involved in the procedure.

The diagnosis of these fractures should be early and treatment, given the risk of infection due to communication with the oral cavity by the surgical wound removal of impacted tooth, resulting in increased morbidity for the patient and hospital stay.

Regarding the type of treatment/ bone fixation, the literature describes various techniques such as fixation with steel wire and lock intermaxila[12], Champy technique[4], plates/ screws 2.0 mm in areas of tension and compression[13] and reconstruction plates[9]. In both cases presented, the choice was made to stable internal fixation with two plates because it is fractures with bone defects,

the result of osteotomy and removal of impacted teeth and avoid locking jaw 30 to 40 days the patient.

4. CONCLUSION

Mandible fracture associated with the removal of the third molar is a rare complication. However, it is serious and may have your risk minimized due an accurate diagnosis, careful evaluation of the difficulty of extraction, identification of high-risk patients and by treatment plan inclusive, which includes appropriate surgical approach to the removal of the least possible amount of bone, tooth sectioning, atraumatic technique and the possible need for card installation and prophylactic screw.

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