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Editorial

We are pleased to announce the launch of Pacific Journal of Medical and Health Sciences with the publication of this issue. The journal is an international, interdisciplinary, peer-reviewed, biannual research publication of Pacific Academy of Higher Education and Research University, Udaipur (Rajasthan), India. On behalf of the editorial team, I would like to extend a warm welcome to the readers of this journal.

Research in medical and health sciences is extremely valuable to society. It adds to the existing body of knowledge pertaining to diseases, risk factors, treatment, outcomes of treatment, side effects of treatment, health care costs and benefits, and future possibilities.

Pacific Journal of Medical and Health Sciences is aimed at publishing important researches and developments in clinical and basic studies of the various aspects and areas of medical and health sciences and promoting communication among specialists, researchers, professionals, doctors, and health workers.

The journal welcomes unpublished, original, research-based, empirical, applied or conceptual papers, articles, reviews, case reports, and short communications for publication.

The editorial decisions will always be guided by the principles of scientific quality and integrity of research as well as professional and ethical standards and norms involved in carrying out the research/study.

I thank the authors, members of the editorial team and reviewers for their efforts in giving shape to this journal. A lot of work has been done to develop this journal, and I trust you will find the efforts reflected in this issue as well as the forthcoming issues.

We hope that the journal will receive enthusiastic response from the concerned community across the world. We welcome feedback and suggestions for improvement of the journal.

Medical Error: An Avoidable Tragedy

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Abstract

Background: Occurrence of medical error during the course of treatment of a patient is not an uncommon event, and it results in huge suffering in the form of morbidity and mortality of the patient.

Aims: The aim of this review article is to create an awareness among medical professionals and draw the attention of administrative and law enforcing authorities.

Methods: For this review article an extensive search of literature in the English language was performed using online search engine PubMed NCBI database, Google search, and other digital sources available online.

Results and Discussion: Medical error is a big public health problem and a very serious threat to our healthcare delivery system. Whatever reports come out through news media are just only the tip of the iceberg. Medical error can happen during diagnosis, during treatment or other stages of healthcare delivery, in the form of act of commission or act of omission and error of planning or error of execution. Only with proper recognition, awareness and comprehensive approach can it be minimized.

Conclusion: Medical errors which can be considered as important reasons for human sufferings are totally preventable and avoidable. An urgent attention is required to put some brake on this, and all stakeholders responsible for health delivery must come forward and play their important role.

Keywords: Medical error; Medical negligence; Patient safety; Never events; Negligence

Introduction

According to an authentic English dictionary, the literal meaning of "Error" is: a wrong action attributable to bad judgement or ignorance or inattention. Errors are part of our daily life and we keep learning from them, But if an error does not give you second opportunity or if it involves morbidity or mortality of a human being that has a wide and remote impact on individuals, family or society, then we can't leave such an error simply to mere chance. A medical error is one such error. Irony of such a medical error is that even though it has got some disastrous effect at individual or mass level, many a time it remains unnoticed and rather than learning from such a mistake to prevent it in the future, people involved in it just sweep it under the carpet.

Occurrence of an error in the course of delivering healthcare is not a new phenomenon; it was mentioned in the ancient Mesopotamian Code of Hammurabi, in the history dated back to 1795-1750 BC.[1] 'First do no harm' admonition of Hippocratic oath has always been a guiding principle for doctors.[2] However, in the course of time and modernization, as health delivery system is becoming increasingly complex, the magnitude and impact of medical error is also changing and becoming increasingly error prone. The important changes in recent times are level of awareness of people and media coverage, which make it difficult to hide things.

It was for the first time that a report entitled " To Err is Human: Building a Safer Health System" brought to the attention of the world the magnitude and serious impact of medical errors. Published in the year 2000 by Institute of Medicine (IOM) of the United States, the report was shocking to the whole world as it cited deaths between 44,000 and 98,000 and over 1 million injuries each year in American hospitals due to medical errors, which remained among the top ten leading causes of death in the USA.[3] With this worldwide attention to unacceptable magnitude of medical error and compromised patient safety, the World Health Organization (WHO) constituted a committee in October,2004 to formulate guidelines to reduce the adverse consequences of unsafe healthcare,which finally issued its their recommendations in 2009.[4]

Methods

For this review article, an extensive search of literature in the English language was performed using online search engine PubMed NCBI database, Goggle search, and other digital sources available online. At first, all related articles that were found to be providing some specific and evidence based information in respect of medical error or highlighting the issue of patient safety were listed and screened. Finally, at the end, 35 studies were selected for review and ultimate analysis. Criteria for inclusion were specific inputs related to medical error, research articles based on cause and prevention of medical error, articles that helped in formulating recommendations and guidelines, books or updates released by concerned organizations on related issue.

Results & Discussion

Medical error is undoubtedly a serious public health problem and a threat to the safety of healthcare delivery. To make healthcare delivery error free first we need to understand medical error itself, its source and causative factor, only then would we be able to reduce this serious health hazard to some acceptable level, if not at zero. Grober ED et al. in their research article, "Defining medical error," defined medical error as an act of omission or commission in planning or execution that contributes or could contribute to an unintended result.[5] So medical error can be defined as "the failure of a planned action to be completed as intended (i.e., error of execution) or the use of a wrong plan to achieve an aim (i.e., error of planning)."

We can classify errors according to their outcome, the kind of procedure involved (medication, surgical or never events in surgery, etc.), the setting where they take place (inpatient, outpatient) or the probability of occurring (high, low).

Different forms of error are adverse event of any sort of treatment, negligence, medication error, wrong-site, wrong-procedure, or wrong-patient

surgery, unintentional retention of a foreign object in a patient's body after surgery. Sometimes all of a sudden, in an unexpected manner, error can crop up. Many a time, although an error happens, it does not harm the patient. This is the near miss error.6 An error in any form can happen at any stage of the delivery of healthcare i.e. right from the time of admission in the form of clerical mistake, patient's assessment, investigations, diagnosis, treatment at the time of discharge in the form of wrong prescription.

There are many ways by which medical errors can be classified, but the following is the most common classification, presented in simplified manner by Institute of Medicine (IOM).3

1.Diagnostic

- Error or delay in diagnosis
- Failure to employ indicated tests
- Use of outmoded tests or therapy
- Failure to act on results of monitoring or testing

2.Treatment

- Error in performance of an operation, procedure, or test
- Error in administering treatment
- Error in the dose or method of using a drug
- Avoidable delay in treatment or in responding to an abnormal test
- Inappropriate care

3. Preventive

- Failure to provide prophylactic treatment
- Inadequate monitoring or follow-up treatment

4. Other

- Failure of communication
- Equipment failure
- Other system failure

Among many risk factors which are directly or indirectly responsible for occurrence of medical error, human error is most important. It can be in the form of act of commission (doing the wrong thing), act of omission (failing to act), error of execution (the correct action does not proceed as intended) and error of planning (the original intended action is not correct).[7]

Next important risk factor is communication error, which happens due to failure to communicate or lack of proper communication or dialogue among members of the medical team at any level. This type of error plays a more important role in surgical never events when poor communication among surgeons, anaesthetists, nurses or paramedical staff can lead to wrong site surgery, surgery on wrong patient, retention of foreign objects inside the body cavity etc.[8]

Other contributing risk factors may be either failure of system which is primarily the responsibility of administrative authority or sudden technical failure of equipment, for example, ventilator, anaesthesia machine, oxygen delivery system, incubator etc.

Impact of Medical Error

Whatever the reason of medical error, ultimately it has got a very serious and disastrous effect as nothing can be costlier than human sufferings or, at the worst, the loss of precious human life. At the end, physical suffering, emotional trauma and financial loss are not limited to patients and their families only but it immensely affects the involved physician as well concerned Institution in a very negative way. At the end, en bloc it affects the productivity of the whole society and nation. Although so many studies have tried to quantify the impact of medical error, the available data are significant enough to make us wretched.[9,10] A true assessment of the financial impact of medical error is not possible as it is not limited to patients and their family members alone but, according to one report, each year in the United States, the claim settlement cost runs in billions of dollars.[11]

There is no doubt that it is the patient who ultimately suffers the most, but another side of the coin is the huge mental agony, feeling of guilt along with loss of reputation and in some cases even loss of job faced by the doctors or health personnels who commit the mistake. This is the reason why

such doctors or health personnels are termed as second victims, and it is probably for this reason that they try to hide the mistake which ultimately blind the system in terms of taking some preventive measures for future.

While in developed countries measures are being taken to increase awareness about the errors related to healthcare delivery and to control them, in respect of developing or under developed countries even the relevant data are not available. In developing countries, whatever reports in respect of medical errors come out through news media or regulatory bodies, they are only the tip of the iceberg. If we compare the availability of hospital infrastructure, surgical instruments, doctor-patient ratio, lack of proper training and awareness of people especially in remote areas of developing countries to that of the developed western world, it is not difficult to assume the prevailing situation.

Scope of Improvement & Road to Safer Healthcare Delivery

Once the magnitude of the impact of medical error was realized, especially after the report of IOM, then along with WHO a lot of other organizations and agencies, for example, National Quality Forum (NQF), Joint Commission on Accreditation of Health Care Organisation, National patient Safety Foundation (NPSF) came into picture and started formulating recommendations to improve safety of our healthcare delivery system. The primary aim of these agencies was to find out the root of problems and formulate the universally applicable guidelines and recommendations that could minimize the medical error and compromise in patient safety.

In a nutshell, the following are the key points which have been found to be helpful in creating a safety system inside healthcare organizations:

1. Mandatory & voluntary reporting: It has been found that the main obstacle in the delivery of safe healthcare system is the identification of the source of problem areas, because to prevent further harm, learning from adverse events is important. In absence of reporting and reviewing of the identified problems, it is impossible to find the solution and then you can't hold anyone accountable as well. So the recommendation is for mandatory reporting to neutral bodies as well as internal reporting for audit purpose and voluntary, confidential reporting to an external group for purposes of quality improvement. At a same time, it is also recommended that this sort of reporting system should be legally protected so that no one can harass or threaten the job, position of a reporting Health personnel.[3]

2. Creating environment of team work with proper communication: A lot many errors happen because of assuming things or taking things for granted, which later turns out as a disaster. So it has been recommended to develop a system of proper communication at every step of delivery of healthcare - whether it is medication and surgery or handing over or taking over the charge of patients. This communication system involves not only verbal exchange but also written exchange of information.

A few example of this are: operating room briefing and debriefing which is sharing of all patient related information preoperatively, intra operatively and postoperatively at the time of handing over and a concept of 'time out' or 'surgical pause' which is a brief, less than one-minute pause in operating-room immediately before incision, during this time each one of the operating team-whether surgeons, anaesthetists, or nurses should verbally confirm the identity of the patient, the operative site and the procedure to be performed.[4,12]

3. Anticipation and awareness: There are so many high risk organizations, e.g. - nuclear reactor, aviation industry which have comparatively much better safety records. The reasons for this are their strict code of conduct, team work and, most importantly, is their being in the anticipation mode.

4. Wide recognition of problem and creation of awareness: Unless the system delivering healthcare recognizes this serious issue of large scale adverse impact of medical error, whatever guidelines or rules, you make, they are not going to work. There must be intense awareness and

vigilance at every level of healthcare delivery. But the fact remains that a large number of people in the developing world are fighting for basic healthcare deliveries and no relevance is there in respect of patient safety and quality of service.

5. Accreditation of healthcare organizations with transparent rating system: Medical profession requires not only good, compatible and able infrastructure at the institutional level but also competent and knowledgeable health personnels. In this regard, accreditation of healthcare organizations with transparent rating system can play an immense role.

6. Mandatory written documentation at every level of healthcare delivery: There are so many recommendations in respect of written documentation such as counting of surgical instruments, sponges, cotton swabs, needle etc., correct labelling of surgical specimens with the identity of the patient, the specimen name and location (site and side) from which the specimen was obtained, labelling of all medicine of particular patient etc.[7,13-15.]

7. Watchdog organization: There must be oversight organization which can keep eyes over performance of healthcare institutions, collect data and take steps to improve their quality, safety and efficiency. Although there are many such organizations that are active and playing very important role in maintenance of patient safety in developed countries, in developing countries like ours no such organizations exist.

At the end, another thing that which we can't deny is that human beings are also fallible beings and even the best persons can commit the worst errors. At the same time, we cannot make any action hundred per cent free of error or free of accident. There is no magic pill available in this regard but with strategic comprehensive approach along with strict implementations of the recommendations and guidelines, large scale suffering of humankind can be minimized to its lowest level.

Conclusion

With all the experiences and studies done in respect of medical error and search for its effective solution, it has become very obvious that most of the errors are preventable and with awareness and will-power a serious tragedy in the form of human suffering can be prevented. For this, strong leadership and activism is required at every level of healthcare delivery as well as all related organizations must come forward to make our health system as error free as possible.

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Small Bowel Obstruction as Late Sequelae of Blunt Abdominal Trauma

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Abstract

Blunt and penetrating abdominal trauma is an important cause of morbidity and mortality. Small Intestine is the third most commonly injured organ in blunt abdominal trauma.1It usually presents acutely, however, rare reports of delayed presentations have been noticed. Here, we report a case of delayed presentation with stricture and small bowel obstruction following abdominal injury.

Keywords: Small bowel obstruction, abdominal trauma, adhesions, bowel stricture.

Introduction

Incidence of bowel injury following blunt trauma abdomen is 5-15%.1 It has been observed that these injuries occur mostly due to road traffic accidents. 85% of cases present as acute and 15% presentation is delayed.1 Small bowel adhesions are thought to occur as a sequela of prior abdominal surgery or inflammatory intestinal disorders like tuberculosis or sealed perforations.2 Adhesive intestinal obstruction resultant to blunt trauma abdomen is rare and here we report one such case.

Case report

A 45-year-old man presented with history of blunt abdominal trauma 3 months back, which was managed conservatively. Initial abdominal ultrasound just after trauma had minimal free fluid while abdominal CECT scan done after trauma was normal. He was symptomless for one month after trauma. Then he started to haveepisodes of colicky abdominal pain and constipation. On examination he had generalized abdominal tenderness without guarding or rigidity. X-ray abdomen showed multiple dilated bowel

loops. Ultrasound(USG) revealed the presence of a thickened segment of bowel and computed tomography (CECT) suggested presence of thickened bowel loops near the ileocecal junction. Due to unremitting pain an emergency laparotomy was performed which revealedfibrotic band adhesions, thickened edematous matted intestinal loops, area of segmental discolorations of proximal ileum, air tight stricture at mid ileum, dilated small gut proximal to stricture. His appendix and Ileocecal junction was normal. Adhesion lysis with resection of discolored bowel segment and barrel ileostomy was performed. Histopathological examination of the resected specimen and interloop bands showed large areas of mucosal ulceration replaced by granulation tissue and focally covered with fibrino-suppurativeexudates. No evidence of any granulomatous or neoplastic pathology was seen.

Discussion

Blunt abdominal trauma producing intraperitoneal injury usually presents acutely, necessitating laparotomy for intestinal perforation or mesenteric vascular injury. In the absence of shock and peritonism, patients with blunt abdominal injury may be treated conservatively. On rare occasions, such patients can present later on with features of small bowel problems.Adhesive intestinal obstruction as a result of blunt trauma abdomen is rare. Delays in presentation between the initial insult to the abdomen and the obstructive episode have been documented to be as long as 26 years in European literature.[2]

Delayed small bowel obstruction after blunt abdominal trauma is a rare clinical entity, with only a few anecdotal case reports described in the world literature.[3] Early presentations are obvious due to the magnanimity of their symptoms, latesymptomatology can be subtle.[1] Initial radiological imaging may be normal and a delayed abdominal scan may prove beneficial.

Some controversy exists about the exact cause of the intestinal stenosis. It is thought that such a delayed stricture is due to subclinical bowel perforation, localised gut ischaemia, or injury to the mesenteric vasculature.[4] Fixed portions of the small bowel, namely, the terminal ileum and proximal jejunum, are prone to perforation during blunt abdominal traumas. A small subclinical perforation may seal offspontaneously producing a stricture due to scar formation.5Another mechanism for post-traumatic small bowel stricture formation is localised bowel ischaemia. Histological examination of the small bowel stricture revealed ulcer formation and fibrosis indicating ischaemic stenosis. Several reports on other subjects have implicated mesenteric injury as the cause of the stricture formation. Mesenteric tears or intramural haematomas have been found on close inspection of the specimens sustaining blunt abdominal trauma may present with delayed small bowel obstruction due to stricture formation.[3]

Regardless of the pathophysiology of this complication of blunt abdominal trauma, the diagnosis of post-traumatic small bowel stricture should be suspected when a patient presents with features of bowel obstruction weeks, or even years, after sustaining abdominal injury. Plain abdominal films may confirm the diagnosis particularly during a bout of colicky pain. Unfortunately, in this case the condition remained undiagnosed due to his vague presentation and the lack of clinical suspicion. In the unclear case, contrast enhanced computed tomography or angiography may reveal a mesenteric haematoma or mesenteric vessel occlusion respectively.[5] The role of diagnostic laparoscopy in all patients with vague abdominal pain and an innocuous radiological finding in the context of prior blunt abdominal trauma needs to be serious consideration.[6]

Posttraumatic small bowel stenosis is an entity that is not widely known. Patients complaining of abdominal pain with no prior abdominal surgery and with a suspicion of partial small bowel obstruction should be specifically questioned about previous blunt trauma. The work-up for these patients should include an abdominal CT and small bowel series. Resection of involved bowel stricture will resolve the symtoms.[7] Small bowel perforation may be sustained at the time of the initial injury. When theperforation is limited it may become sealed by mucosa and omentum. Despite continuing symptoms, it may not come to mind until the patient presented with intestinal obstruction. A high index of clinical suspicion is paramount when dealing with thevictims of blunt abdominal trauma. When

abdominal symptoms continue, stricture formation should be considered and confirmed or excluded by a small bowel enema[4]

Conclusion

Small bowel stricture should be borne in mind when a patient presents with obscure abdominal pain and a previous history of even apparently minor abdominal trauma.

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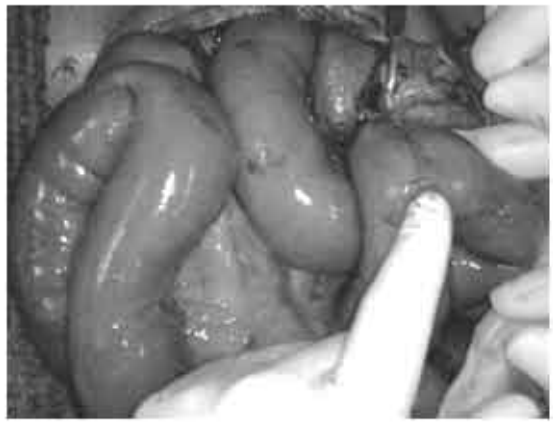

Fig.1: Adhesive Band around the small gut

Fig.2: Constricted part of small gut causing obstruction

Fig. 3: Separated part of large and small intestine

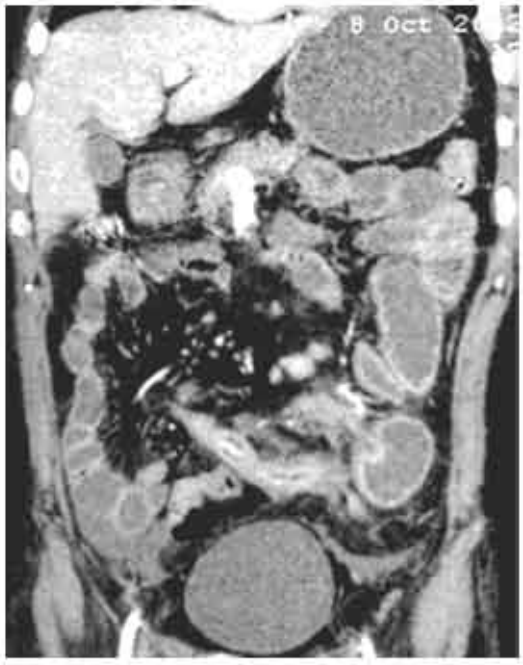

Fig. 4: CECT Image.

Fig. 5: CECT Image.

Fig. 6: CECT Image.

Mythology, Cow And A1 /A2 Milk

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The cow has been a symbol of wealth since ancient times. Milk's special importance in India is well described in Hindu mythology. Hindus consider the cow as a sacred embodiment of Kamdhenu. Hindus use milk and its products for religious purposes because it is believed to have purifying qualities. Ghee, clarified butter, is used in lamps for rituals. Milk is used to bathe Hindu idols on special occasions. As per Rig Veda, cattle are one of the most important animals, and several hymns refer to ten thousand and more cattle (Wikipedia). Rig Veda 7.95.2. and other verses (e.g., 8.21.18) also mention that the sarasvati region poured milk and clarified butter (ghee), indicating that cattle were herded in this region (Aparna, 2015) and probably it was the main occupation of people, besides agriculture.

The cow was venerated by Mahatma Gandhi too. He said: "I worship it and I shall defend its worship against the whole world," and that, "The central fact of Hinduism is cow protection. He regarded the cow as better than the earthly mother and called herthe mother to millions of Indian mankind (Alhaji Alhasan Abdulai, 2015).Our mother, when she dies, means expenses of burial or cremation. On the other hand, the mother cow is as useful both as dead and alive. We can make use of every part of her body — her flesh, her bones, her intestines, her horns, and her skin. For Gandhi, the cow is a "poem of mercy", and protection of the cow is the gift of Hinduism to the world, because to protect the mother cow means protecting all weak lives in this world.

Available literature educates us that the ancient Egyptians sacrificed animals but not the cow, because it was sacred to goddess Hathor (Smith.F.General, 1913). It also includes references to the goddess Kamdhenu. The goddess manifested itself as a wish-granting divine cow.

Milk also goes beyond religion. Ghee spread on flatbread can be a special treat for the poor. Buttermilk is a popular summer drink to soothe the stomach. In India, you cannot escape calorie-filled sweets made with milk. Another thing common is the morning cup of milky tea. Tiny tea stalls start their businesses early. They serve migrant laborers.

Our ancient literature suggests that Indian cow is the only divine living being that has a *Surya Ketu Nadi* (vein connected to the sun) passing through her backbone. It is believed that this *nadi* absorbs the medicinal essence from the sun. As *Surya Ketu Nadi* interacts with solar rays, gold salts are produced in her blood. Thus, the cow's milk, butter and ghee assume golden hue. The Indian cow is distinguished by a hump which is absent in other cows. It also possesses a dewlap (prominent specific fold of the skin hanging below the neck). This

dewlap gives immunity power to the cow and the products obtained from it. The dung of the Vedic cow is always covered with a thin membrane. It always has a pleasing odor. The dung of other cows is of liquid consistency. Their dung does not have a membrane to make it semi-solid. (Ajit Vadakayil, 2013).The odor of the dung of non-Indian cows is repulsive, it smells awful. Indian cows have comparatively long ears.

In spite of all these facts, these days the debate is going on on the consumption of cow milk. Some believe that milk is not at all required for the adult as it is meant for calves, that too for a limited period of 6-8 months.

It is only the human being who consumes and recommends the cow-milk till his last breath. Looking to the importance of milk, various attempts have been made by scientists (animal, veterinary, dairy etc.) to increase milk production . In this process various high yielding cow breeds (Holstein, Friesian, Brown Swiss, Guernsey etc.) have been evolved to meet the milk demand of the world.

Under Indian conditions, where Indian cows seem to be low in milk production,to increase their productivity, the exotic blood has been introduced in Indian cows by means of cross breeding process (V Adamec et al, 2006). This process increases the milk production tremendously but we are forced to lose our original breeds (Rathi, Tharpaker, Sahiwal, Kankrej etc.) (Joshi, B.K, 2011)

During the 1990s, it came to the notice of New Zealand scientists that a few breeds of cows were producing milk which was detrimental to the health of human beings. As a result, again the research was initiated for analysis of the milk of various cow breeds of the world in order to figure out the reason for such adverse effect.

It is a matter of great satisfaction that Indian breeds are found to be satisfactory without any effect on the consumer's health other than lactose intolerance, so various scientists from New Zealand, Holland etc. started cross breeding our breed with theirs for better results. But as a matter of surprise, today Indian population is facing a controversial issue of milk as A1 and A2 type, as a result of this cross breed transformation.

Before coming to A1, A2 milk, it seems logical for all concerned to have a comparative idea about some of the important breeds of the cow along with its average mik production and length of lactation period (period in days where the cow gives milk after calving).

BREED	LACTATION PERIOD	AVERAGE YIELD PER LACTATION(kg)	FAT (%)	LACTOSE (% by weight)	ASH (%)	Protein (%)
Jersey	305 days	5000 - 8000	4.9 -5	4.71	0.77	3.9
Holstein	305 days	7200 - 9000	3.2 -3.7	4.68	0.73	3.1
Gir	300 days	900 - 1600	4.5	4.65	0.66	3.3
Sahiwal	305 days	1350-2100	4-4.5	4.62	0.66	3.4

Table 1: Composition & Lactation period of cow (Ramanujan, Textbook of Animal Husbandry)

The controversial issue lies in the genetic makeup of different proteins. The following figure shows the components in cow milk. Also, the protein distribution in bovine milk is depicted as under:

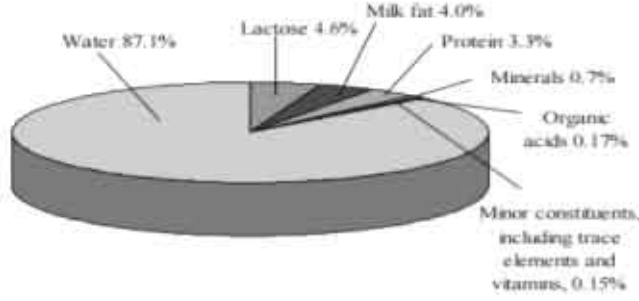


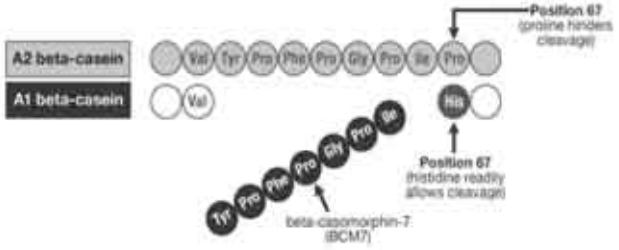
Fig.1: Approximate composition of milk (Walstra, Wouters & Geurts, 2006).

	α s1 Casein (g/l)	α s2 Casein (g/l)	β Casein (g/l)	β-Lactoglobulin	α-Lactalbumin
Bovine milk	12-15	3 - 4	9 -11	2-4	0.6 - 1.7

What Are A1 And A2 Types of Milk?

Both A1 and A2 types of milk are the result of evaluation of two genetically evolving different cow breeds. It is a well known fact that milk contains proteins: whey and casein, casein as a chief protein besides lactalbumin and lactoglobulin (Hansen LB 2000). Casein is further divided into αS1casein, αS2 casein, β casein, κ casein. All controversies started when genetic mutation took place. (Bell et al, 2006).

The gene encoding beta-casein was changed in such a way that the 67th amino acid in the 209 amino acid chain was switched from proline to histidine. (Monika S, et al 2015). This new kind of beta-casein is known as A1 beta-casein which is found in the milk of many cows such as Holstein, Friesian etc.



Beta-caseins can have a helpful effect on the body. But drinking A1 milk may not be so helpful. When we drink the milk of an A1 cow, the body breaks it down to produce high levels of a molecule that is not a healthy sign. This is a bioactive opioid peptide and morphine-related compound called **beta casomorphin-7 (BCM7)** (Ivanoet al, 2009) While A2 milk also causes some of this morphine molecule to be produced, it is negligible as compared to A1 milk. BCM7 is a very active molecule in our body. Animal studies have singled out BCM7 since it creates inflammatory reactions in the small intestines. It also changes the hormonal function, as well as affects the nervous and immune system. BCM7 causes brain fog, poor thinking, and problems with sleep. Human trials conducted and reported in European Journal of Clinical Nutrition, 2014 by Associate Professor, Sebely Pal mentioned adverse effects of consuming A1 and A2 milk. (Clarke et al,2014)

These neurologic issues may also be a factor in the concerns with schizophrenia and autism (Cade R, et al, 2000). The ischemic heart disease is the most common cause of death in the majority of countries.A study in New Zealand looking at 20 affluent countries clearly showed higher rates of death from a type of heart disease called ischemic heart disease in A1 milk drinkers, while the A2 variety shows lower cardiovascular problems and type-I diabetes (Truswell,2005).

Several reports (Anand Singh, 2012) advocated that humans on an A2 milk diet had less bloating abdominal pain and firmer stools since they stayed off the A1 beta casein. The tests were carried out on 41 persons for eight weeks.

Impact of A1 and A2 Milk on Human Health

Milk from dairy cows provides a high quality source of protein and essential micronutrients like calcium, magnesium and phosphorus to human beings. (Bell et al., 2006).

The Food and Agriculture Organization (FAO, 2012) has reported increase in many chronic diseases arising out of milk. Genetic variants in bovine β-casein gene (A1 and B) release a bioactive peptide, β-casomorphin-7upon digestion, responsible for many human disorders like Type 1 diabetes, autism, schizophrenia and heart diseases but A2 milk does not cause such type of illnesses (Woodfordet al., 2007).

Infants may absorb BCM-7 due to an immature gastrointestinal tract. Adults, on the other hand, appear to reap the biological activity locally on the intestinal brush boarder. BCM -7 can potentially affect numerous opioid receptors in the nervous, endocrine, and immune systems.(Clarke et al, 2006).

Whether there is a definite health benefit of milk containing the A2 genetic variant is unknown and requires further investigation. However, the harmful effects of A1 milk are not so unknown. With the increasing intake of dairy products, the consumption of other essential nutrients such as zinc, vitamin A, magnesium, folate, and riboflavin is also increasing (Weinberg et al., 2004).

The Mg content of A1 milk is lower as compared to A2 and Mg is a very important mineral for various functions of humans. Magnesium relaxes us, helps improve digestion. It is anti-inflammatory in action, involved in nerve and muscle function, de-toxifier, increases alkalinity of the blood and flexibility of the tissues. Magnesium is required for the body to produce and store energy.

The inflammation from A1 milk casein causes lymphatic congestion and metabolic suppression. A1 milk worsens acne, eczema, upper respiratory infections, asthma and allergies. It causes digestive

problems, not because of the lactose but because of massive histamine release from casomorphin. Ear infections, bronchitis, tonsillitis are driven by A1 casein. A1 milk casein causes endometriosis because of its inflammatory and immune-disruptive effect (PrasantaBoro et al, 2016).

Conclusion

A1 A2 milk concept is a designer level of milk for health conscious people. A2 milk is popular abroad and is said to have so many properties which can prevent and avoid so many diseases. No concentrate specifically indicates A1 milk is in charge of a few ailments or A2 milk counteracts such sicknesses. In last 20 to 30 years, several studies have been carried out on A1 milk and its effect on human health. Factual information corresponds its part in non-transferable clutters (diabetes, autism).

At the same time animal studies and even human studies do not give substantial evidence of A1 milk for its role in the above mentioned disorders. That is why we are still consuming A1 milk and it is not banned. It seems that early consumption could have an indirect role in the disorders along with other environmental factors and food habits. South East Asian countries, including India have A2 herd of cattle and their milk is in general of type A2 in nature and it seems that A1 milk is not an issue for them

In India still majority of milk comes from the buffalo which is A2 in nature. In this perspective, ICAR (Indian Council of Agriculture Research) is seeking to accomplish more research on A1 milk and putting asset to screen A1 allele recurrence in crossbreds. It is additionally taken as a top priority that we likewise require measurable information and human studies on A1 milk to see whether it has any part in irritating non transmittable scatters in Indian populace.

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An Analytical Study of Health Security as a Social Security Benefit in BHEL, Bhopal

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Introduction

In order to trim human resources, many organizations announce nice-looking premature retirement policies for employees and widely publicise voluntary retirement schemes. Experience shows that the benefits of such type of retirement may seem attractive in the immediate present, but in the long run the claim of financial and social security may prove false. During old age, working capacity gets exhausted and medical assistance is very frequently required in retired life.

Looking into health related security of employee, the International Labour Organization (ILO) developed some models and standards as and when required. The concept of social security was amply discussed at international level and it emerged as the main statement of 102nd convention of International Labour Organization (ILO). The statement refers to nine components of social security benefits in which medical care is closely related to employee's health. (Annexure-1) In this article, health security related facilities available to the retired employees of BHEL, Bhopal is discussed on the basis of available amenities and infrastructural development.

History and Growth of Health Care Services

The modest beginnings of health services in the then HEIL (Heavy Electricals India Limited) opened in a residential quarter of the township. With the passage of time, more and more health security related facilities including development of dispensaries in every sector, more medical equipment, infrastructure and clinical facilities have been provided to ensure health security of employees and their wards.

The first-aid facility was developed as an important step towards social security of employees and every year, a good number of employees from different workplaces as volunteers were exposed to the awareness programs on first-aid training. Likewise, outdoor patient's health services are extended to all dispensaries, spread over all sectors of the township. In addition to this the employees of educational societies managed by this unit are also covered as beneficiaries of outdoor treatment from dispensaries.

Outdoor Medical Facilities

All employees are given documents named “medical token” and “medical books” in which details of all family members and their photographs are affixed for ready reference. On production of the medical book, doctors recommend various investigations and pathological tests. Thus,the medical

token and medical books form important historical document to avail health related social security from the organization.

The outdoor treatment facilities for retired employees covered under Retired Employees' Contributory Health scheme (RECH) is also similar to the treatment scheme for regular employees only with a minor difference of color of the medical token and medical books.

Indoor Patient's Health Services

The Kasturba Hospital, the hospital main hospital of the organization was built in different phases, and now it is fully equipped with all modern facilities. It provides indoor treatment to patients recommended by doctors from emergency treatment cell or by the doctors of different dispensaries.

A separate treatment file is prepared on the registration counter of the main hospital for admission as indoor patient. With this treatment file and medical card, the patient is admitted in the concerned ward of the main hospital.

The indoor wards are: 1. Male medical ward, 2. Female medical ward, 3. Male surgical ward, 4. Female surgical ward, 5. Children ward, 6. Male Neurosurgical ward, 7. Female Neurosurgical ward, 8. Private Ward, and 9. Isolation Ward. In addition to these wards, the female patients have a separate wing for giving births to children known as "labour room".

Intensive Care Unit (ICU) and Intermediate Care Unit of this hospital provide treatment to serious patients under continuous monitoring of specialized doctors and nursing staff. This section of the hospital caters to patients with serious injuries and illnesses, most of which are life-threatening and need constant monitoring and support from equipment and medication in order to maintain normal bodily functions.

All patients registered as indoor patients are admitted in the respective wards on the basis of admission file. The admission file carries record of every type of treatment, medical examinations and recommendations of the concerned doctors.

Other Health Services in the Kasturba Hospital (Main Hospital)

The Kasturba hospital provides almost all type of health service required in any general hospital. The various departments of indoor facilities are: Eye department, Radiology department, Orthopedics department, Chest department, ENT department, Dental Department, Physiotherapy Department, and Operation theater.

Eye Department: The Eye department of the Kasturba hospital has been in operation since the inception of the organization. As such the medical examination of any new recruitment begins at this department. Eye test ensures social security of employees and controls any type of communicable disease.

Orthopedics Department: The Orthopaedic unit of the Kasturba hospital provides a comprehensive and integrated orthopaedic program for patients. In addition to general Orthopaedics, the department has facilities which specialize in the field of joint replacement, hand surgery, spine surgery and treatment of complex trauma.

Radiology Department: The radiology department also known as the imaging department (radiology) offers diagnostic and interventional imaging services for both in-patients and out-patients. The patients from dispensaries, medical and surgical outdoor sections, as referred by the concerned doctors and in-patient wards or from the emergency department come for x-ray services in this section of the Kasturba hospital. Generally, it is emergency x-ray and general x-ray services that are available in the department. The cases of CT scanning, MRI scanning and other special radiological investigations are referred to other hospitals.

Chest Department: The Chest Clinic provides expert services in the management of acute and chronic respiratory disorders. Respiratory medicine service aims to develop and deliver comprehensive services for patients with all types of lung disease. Physicians with huge experience and expertise provide services of respiratory medicine. The services of this cell include assessment and diagnosis of respiratory diseases, diagnosis, treatment and follow of up lung cancer patients, diagnosis, treatment and follow up T.B.

patients, assessment and prescription of home oxygen, referral for lung surgery.

ENT Department: The ENT (Ear, Nose and Throat) department provides services related to ear, nose and throat-related problems including general ear, nose and throat diseases, balance and hearing disorders, snoring and sleep apnea, ENT allergy problems and voice disorders, etc. Outdoor patients, referred by other dispensaries and specialists from the main hospital are given consultation on every working day.

Dental Clinic: Qualified dentists take care of this section and handle all dental ailments of patients. Extraction of tooth is done in the medical department; however, facilities for artificial tooth is not available. Surgery and operations are also done as and when required.

Physiotherapy Facilities: Physiotherapy section of health services department is one of the most useful sections for all those patients who need post operative care. During physiotherapy services, both traditional and non-traditional forms of physiotherapy according to prescription of the concerned doctors are applied to address the problems of patients.

Operation Theater Facilities: There are two operation theaters in the Kasturba hospital. Operation theaters are fully sterilized. All doctors, nurses and supporting staff wear sterilized clothes, use sterilized equipment, and there are absolutely zero chances of infection during any surgical operation. This level of hygienic standard of operation theater assures the patient under operation and their wards of total safety during and after any surgical activities performed for health security of employees and their family members.

Other Facilities Available in Kasturba Hospital

BHEL, Bhopal developed sufficient medical facilities for all regular and retired employees of the organization. All health services are managed by the Kasturba hospital. Apart from administrative setup, this main hospital carries a number of updated facilities to treat ailments and to take care of health related problems. Some of the facilities, which are often required by patients are available at Kasturba hospital as follows:

Ambulance Service and Reception: This section of medical services is open for all days and ambulance services are available round the clock. At present, there are only three ambulances in the department. Although, this facility is limited to local residents only, however, on request of a large number of trade union representatives and retired employees, ambulance service has been extended to some of the satellite colonies also. Many regular and retired employees do not depend on the ambulance services as many of them have their own conveyance or manage with their own resources.

May I Help You Counter: This is a kind of enquiry counter which provides assistance in arranging wheel chair for patients and guide visitors.

Catering Facilities for Indoor Patients: The well managed catering facilities of this hospital are highly advantageous for the health of indoor patients. The role of dietician may be seen from the very first day of the admission of indoor patients. This lasts till the discharge of patient from the hospital. Every day, quality vegetables and non-vegetarian cooking material is bought and used in the kitchen.

Food Facilities for Attendants: The management of the main hospital provides lunch, dinner and breakfast to all indoor patients; however, paid facilities for their attendants is available in the hospital premises. This facility, known as "Vatika" is managed by a voluntary organization "ladies club", an association of women in BHEL, Bhopal.

Birth and Death Registration Facilities: All records of birth and death are manually registered on the basis of birth certificate from the Kasturba hospital or any other hospital, recognized by this organization. Similarly, death of any member, registered in the medical token of the concerned employee is also recorded on the basis of any legitimate document. On request of the applicant employee, birth or death certificate is issued from this "Birth and Death Cell" and hand written certificates on pre-printed form are issued as per directives of the state government.

Mortuary Services: The dead bodies are kept on ice in this mortuary. The mortuary operates only during working hours of the hospital with its management and

functions under the control of emergency doctors. The mortuary services are accompanied by transport services to carry dead body to the residence and then to the place of cremation or burial. The services after death offered by the organization are widely appreciated by all members of the society. However, most of the employees expressed their deep concern about poor maintenance of vehicles used in this service. Around 60 percent of respondents expressed need for major upgradation of mortuary services in terms of quality and 48 respondents favoured new "Shanti-Vahan" in this service.

Parking Facilities for Vehicles: Sufficient parking facilities are developed in the campus of the main hospital and in all satellite dispensaries. Although free parking facilities are available in all dispensaries, paid parking facilities are provided in the campus of the main hospital.

Market Facilities: There is a shopping area very near to the main hospital, known as "Habibganj market", which caters to the routine requirements of the medical staff living in Habibganj area and also the casual requirements of patients admitted in the hospital. In addition to this sector market, weekly market facilities are also available near the main hospital. The weekly market is held on every Tuesday of the week and all fruits, vegetables and other items are available in this weekly market.

Residential Facilities for Medical Staff: Care is taken by the town administration to provide residential facilities to the concerned medical staff in the nearby places of the township. The doctors, nurses and the other members of the medical staff are given priority in the allotment of residential quarters near by the Kasturba hospital. Earlier, a separate area called Habibganj was developed for medical staff near the Kasturba hospital.

Medicine Dispensing Counters: Each dispensary in the township has a separate medicine dispensing counter. Considering the convenience of patients, the main hospital has established multiple dispensing counters. Qualified pharmacists are managing dispensing activities at every place.

Computer Centre: With the advancement in office automation, computer related activities are gaining roots in every activity of hospital management. Computerization of basic sources of employee related data has helped employees in many ways. It is now possible for employees to get results of pathological examination, information about the type of blood group, age of donor and contact point, etc.

Consultation with Specialists in Bhopal: The health service department has close interaction with Gandhi Medical College and its associated Hamidia Hospital. In addition to this, a panel of reputed doctors is also prepared by the medical department to locally refer medical cases for consultation.

Referral Cases

All referral cases are based on the recommendations of the concerned doctors (Specialists). The mental satisfaction of patient and his / her family members is also kept in mind, while referring such cases. The organization reimburses consultation fee and the medicines as per rules.

Eco-friendly Environment

The main hospital area including private wards and isolation ward as well as surroundings of all dispensaries are provided with ample greenery. A good number of plants are maintained by horticulture department of the organization. However, the areas around dispensaries need more plants to give natural cooling in summer season.

Problems Encountered by Retired Employees in Availing Outdoor Medical Facilities

Inspite of a number of merits associated with outdoor medical facilities, there have been some serious demerits. Firstly, as per company rules, the retired employees are required to vacate company accommodation located in the township. Secondly, there are many employees who have their own living arrangements either in the surrounding residential colonies or in the city of Bhopal. Therefore, availing free medical facilities at BHEL is more uneconomical and costlier. There are more than 10,000 beneficiaries of health services from among retired employees and their spouses, widows and dependents of the deceased employees of BHEL, availing medical facilities under health scheme. These beneficiaries encounter some problems in availing the social security benefits of the prevailing health services of the organization.

Such problems may be grouped under three main factors: distance factor, conveyance factor, procedural and financial constraints. Some of these factors are briefly discussed below:

Procedural Constraints: It is also observed that the decision makers of the organization express their inability to deviate from the laid down policy of the organization or to take any decision on humanitarian grounds on their own. The helpless retired employees, in the absence of any adequate and effective representation, feel at a loss to convey their feelings to appropriate officials in the organization. Thus, communication gap exists between retired employees and the hospital administration.

Financial Constraints: The old and retired employees have financial limitations and are dependent on organizational health services. That so many retired employees visit dispensaries or hospital for some reason or the other clearly shows this dependence. On the other hand, services of private doctors, nurses or physiotherapists are beyond the reach of many retired employees. Under such financial constraints, the retired employees have to face many difficulties.

Distance Factor: Most of the retired employees live in their own houses constructed in newly developed colonies. These colonies are far from their respective dispensaries. Neither, the public transport nor private auto rikshas are easily available in these newly developed areas. Thus, in case of any emergency, such people face many problems travelling along distances.

Conveyance Factor: It is also observed that many old retired employees do not have their personal vehicles. Even if the vehicle is available, these senior citizens are unable to drive. Under either circumstances, dependence on hired conveyance increases their worries and anxiety, especially in the case of any emergency.

General Social Security Aspects of Out-patient Services

As mentioned above, a patient who is not hospitalized overnight but who visits a hospital, clinic, or associated facility for diagnosis or treatment is termed as outpatient. Thus, all dispensaries of this organization may be classified under the category of out-patients health care centers. The out-patient medical facilities are also available for a few types of centralized medical services at the Kasturba hospital, such as dental care, etc. These services are not available at dispensaries.

Motivational Aspects to Maintain Good Health: As prevention is always better than cure, the more the preventive steps are taken, the better will be the results. BHEL management initiated very innovative steps in the direction of such preventive measures. The present yoga and research centre is one such example. It is also seen that yoga programs are regularly conducted in this research centre. Retired and regular employees along with their family members take full advantage of this extended facility. However, the same infrastructure could also be developed as permanent venue for lectures, seminars or any such programs oriented towards health care activities.

Medical Facilities for Retired Employees: Free medical facilities are available to all retired employees and their spouses; however, retired employees of this organization are covered under the scheme, known as "Retired Employees' Contributory Health Scheme (RECH)". This scheme is intended to extend medical cover to the retired BHEL employees and his/her spouse and spouse of an employee who dies while in service and subjected to certain conditions laid down in "HR Manual." In order to avail facilities under this scheme, eligible applicant is required to follow procedure of registration (one-time), payment of regular contribution and annual re-validation of fee, etc.

In line with the above referred circular, the management of BHEL, Bhopal introduced this unique social security scheme for all retired employees of this organization. Under the said scheme, every retired employee, spouse and unmarried legitimate children are registered on deposit of a token amount towards registration fee in medical department. This registration entitles the retired employee and his/her family members to avail free medical treatment according to the medical token issued by the medical department.

The medical token is a card in which recent photograph

of each member is pasted. Each member of the family, registered in the medical token is issued a separate medical treatment book. This administrative mechanism enables the retired employee and his/her spouse (including other legitimate and entitled family members, if any) as well as medical department to access complete medical history of the entitled patient. The utility of a such record lies in deciding the line of treatment, which differs from case to case and ailment to aliment. Another feature of the medical token and medical book is that it enables the concerned patient to avail medical treatment as outdoor patient in respective sector dispensaries. These two documents are also verified at the time of admission of the eligible patient as indoor patient in the main hospital.

In order to keep medical facilities continued without interruption, the retired employee is also required to renew the validity of the medical token, preferably in the beginning of every financial year or as mentioned in medical token and medical book. Thus, periodically, usually before the due date, every retired employee is required to observe this small formality in medical department.

All retired employees, registered under this scheme are eligible for free consultation and free medical check-up. Similarly, all types of pathological tests, clinical examinations and other special tests as prescribed by the concerned doctor in the dispensary or the main hospital are also made available without any charges. Another salient feature of the scheme is that there is absolutely no discrimination between regular and retired employees, as all retired employees also get all medical facilities at par with regular employees of this organization.

Retired employees also get free medical treatment anywhere in the country in government hospitals, hospitals run by any charitable trust or private hospitals equipped with some specialties, provided these facilities are not available in the Kasturba Hospital of BHEL-Bhopal. Such cases must be referred by the respective medical department of the hospital.

However, free medical facilities do not include all types of expenses born by any individual. They are limited to certain expenses like consultation charges, cost of medicine, pathological tests, etc., These expenses are reimbursed in the case of outside referral cases only.

The free medical facility for retired employees has proved one of the most valuable and widely appreciated social security measures among retired employees. The simplicity of this system keeps away a number of official formalities, and treatment is available round the clock for all 365 days in BHEL hospital.

As per the record, more than 11000 employees and their spouses are registered under RECH scheme. All these registered members are eligible for medical facilities under the scheme "RECH". Out of these retired employees, some of belong to the sister-units of the organization and have already opted for availing contributory health scheme from Bhopal Unit.

The salient features of this scheme include contribution details, annual re-validation, scope and benefits allowed to retired employees.

Conclusion

The health services of BHEL, Bhopal for regular and retired employees are very much admired by the residents of Bhopal and the employees in the sister units of BHEL. Although, management of this organization is trying to provide maximum social security of employees and their family members, a wide gap between the expectation and satisfaction of beneficiaries exists. This suggests that many more health services are needed and some of the old age facilities need to be reviewed

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Oral Appliance Therapy For Obstructive Sleep Apnea

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Abstract

Sleep Disordered Breathing (SDB) is a collective term for simple snoring, upper airway resistance syndrome and Obstructive Sleep Apnea (OSA).It is characterized by repetitive upper airway obstruction and consequent oxyhaemoglobin desaturation during deep stages of sleep

Keywords: Oral Appliance.

Introduction

Sleep D disordered Breathing (SDB) is a collective term for simple snoring, upper airway resistance syndrome and Obstructive Sleep Apnea (OSA).It is characterized by repetitive upper airway obstruction and consequent oxyhaemoglobin desaturation during deep stages of sleep. Obstructive sleep apnea (OSA) is a common disease that is estimated to affect 2% of middle-aged women and 4% of middle-aged men.[1]

OSA is considered one of several potentially treatable contributors to systemic hypertension, and has been associated with coronary artery disease, stroke, congestive heart failure, atrial fibrillation, increased motor vehicle accidentrate, sleepiness, impaired quality of life, and increased mortality.[2]

Etiology And athogenesis

OSA is characterized by a collapsing of the tongue back into the pharynx during sleep. Typically this is because of large tongue, small air pathway or abnormal throat anatomy (fig 1).

This blockage restricts breathing, lowering the concentration of oxygen in the blood until receptors in carotid sinus are altered to higher C O2 levels in the body causing the patient to wake up and normal breathing is restored. When patient falls into deep sleep, tongue collapses again and another apneic episode takes place.

Diagonsis

OSA is characterized by repetitive episodes of complete (apnea) or partial

(hypopnea) upper airway obstruction occurring during sleep[3].

Whereas apnea is complete cessation of airflow, hypopnea is characterized by a 70% reduction of airflow for ?10 seconds or any reduction in airflow that is associated with either an arousal from sleep or a ?3% arterial oxygen desaturation.

Apneas and hypopneas, as a result of these varying degrees and locations of upper airway obstructions are regarded as the most common sleep related breathing disorders (SRBD).[4]

In order to make diagnosis of OSA, a sleep study must demonstrate a minimum of five or more apneic or hypopneicepisodes per each hour of sleep or 30 episodes per 6 hours of sleep.[5]

Polysomnography is the gold standard for diagnosing OSA and consists of detailed overnight sleep study in a laboratory.[6]

The multiple sleep latency test (MSL T) is used to establish how rapidly the patients falls asleep to distinguish it from narcolepsy.

The Epworth sleepiness scale is a questionnaire used to screen for sleep apnea.[7]

The Mallampati score (grade 1-4) can be used as a predictor of sleep apnea particularly in cases where an enlarged tongue seems to be the cause for airway obstruction.

Clinical evaluation should be done to observe presence of Nasal Obstruction, Long, thick soft palate, Retro displaced Mandible, N arrowed oropharynx, Redundant pharyngeal tissues Large lingual tonsil, Large tongue, Large or floppy Epiglottis and Retro-displaced hyoid complex.

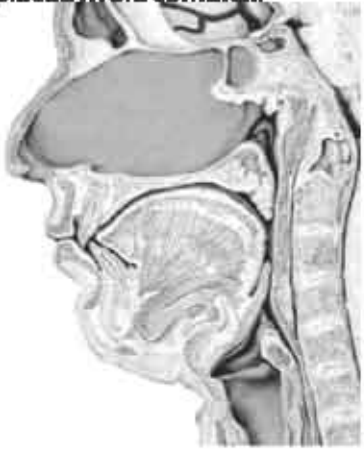


Fig 1: Showing retruded mandible, retruded enlarged tongue and elevated soft palate obstructing the airway.

Management Of Patient With OSA

Life style modification

1. Weight loss is recommended for all overweight patients to control sleep apnea.
2. Positional therapy: placing the patient in non-supine position to prevent patient from sleeping in a supine position.
3 Alcohol consumption should be avoided in the evening as alcohol may relax the airway making the airway more prone to obstruction at susceptible sites.

Continuous Positive Airway Pressure (CPAP)

Sullivan and colleagues reported the use of nasal continuous positive airway pressure (CPAP) for treatment of OSA.[8] Nasal CPAP maintains the upper airway patency during sleep by way of a pneumatics tent. The treatment is administered via nasal mask. It is most prescribed treatment for OSA for moderate to severe cases and is almost always effective, but its success is limited by patient's level of compliance which is estimated to be 30-40%. The CPAP machine is large and cumbersome and its use can have irritating side effects such as nasal congestion and throat dryness.

Oral Appliance Therapy in Management of OSA

Oral appliances find their greatest success when utilized for simple snoring, upper airway resistance syndrome and mild to moderate obstructive sleep apnea.

A large literature review by Lowe showed that, oral appliances were effective in mild to moderate OSA with 75 % compliance rate.[10] Oral appliance therapy has been accepted by the American Sleep D is order Association as an appropriate treatment modality for OSA patient.

Tongue Retention -Tongue Retaining Devices (TRD) TRD have an anterior hollow bulb, which creates a negative pressure i.e. vacuum ,when tongue is inserted in the bulb. Tongue is held

forward away from post pharyngeal wall, opening the airway. This appliance simultaneously modifies the position of the mandible.

Mandibular Repositioning or Advancement Devices (MRD / MAD)

They function by engaging one or both dental arches to modify mandibular protrusion and improve the velopharyngeal airwaypatency.[11] The most common mandibular repositioning dimension quoted is 50-75 % of maximal protrusion (Approximately 5-7mm).12 As these appliances hold the mandible in antero-inferior position, these indirectly bring the tongue forward as a consequence of muscle attachment and open up the posterior airway. The repositioning may also stretch and reduce the collapsibility of soft palate via its connection to the base of tongue and increase the superior airway space.

Although tongue repositioning devices and mandibular advancement devices have been standard appliances for treatment of OSA, a recent study be Venket R et al describes the use, four new appliances for managing sleep apneanamely uvula lift appliance, uvula and velopharynx lift appliances, nasopharyngeal aperture guard and soft palate lift appliance and a conventional mandibular advancement appliance. He concluded that nasopharyngeal aperture guard appliances was the best among the five type of appliances.[12]

Design Consideration of Oral Appliances

Design variations depend upon

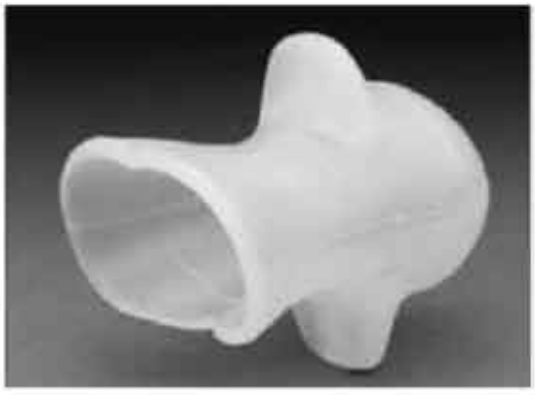
- Method of retention
- Flexibility of material: polyvinyl vacuum formed thermoplastic appliances or hard acrylic
- Adjustability : fixed or adjustable
- Vertical opening
- Freedom of jaw movement

1. One of the accepted design is one-piece non-adjustable soft vinyl vacuum formed mandibular repositioning appliance consisting of thermoplastic material covering the maxillary and mandibular arches in the desired antero inferior position. The occlusal position is established and recorded by either a wax bite, silicon bite or anterior jig with inter occlusal registration.[13] (Fig. 2)

2. In the two part Herb - style appliance, the arches are connected by pivoting bars that can be altered in length to titrate the protrusive mandibular position for effectiveness and comfort. The occlusal registration for these two part appliances is not as important because mandibular reposition can be titrated from the intercostal position.[13] (Fig.3)

3. TAP (Thornton Adjustable Positioner) appliance uses a hook on the maxilla to attach to the mandible in order to bring it forward. (Fig. 4)

4. For edentulous patients with OSA, a Tongue Stabilizing Device (TSD) can be used which does not attach to teeth and acts as a pacifier. It is made of soft silicon and holds the tongue forward by gentle suction preventing it from falling back. (Fig. 5)



Advantages Of Oral Appliances

1. Relatively low cost
2. Good compliance from the patient
3. Rapid effect and easy termination without effect
4. More benign adverse-effect profile
5. Insertion can be performed as a single stage procedure is an outpatient setting
6. Improve the blood oxygen saturation levels as they relieve the apnea in 20-75 % of patients

Disadvantages Of Oral Appliances

1. Excessive salivation
2. Muscle and tooth discomfort
3. TMJ pain

SURGERY AS TREATMENT OPTION

Surgery should be considered as last treatment of option of OSA. Following types of surgeries are performed

1. Uvulopharyngopalatoplasty
2. Maxillomandibular advancement surgery
3. Pillar palatal implant surgery

Conclusion

Obstructive sleep apnea is a sleep disorder of airflow at the nose and mouth during sleep. Patients with undiagnosed sleep apnea represent a major public health problem. Dental professional shave a unique doctor patient relationship that can help them in recognizing the sleep disorder and co-managing the patients along with a physician or a sleep specialist. Oral appliance therapy is an important treatment modality for sleep apnea patients

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C-Shaped Root Canal In A Mandibular Second Molar: A Case Report

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Reader

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Abstract

This clinical report presents the endodontic treatment of a mandibular second molar with a C-shaped root canal system. The endodontic access cavity displayed three canal orifices joined to form a single C-shaped canal. Root canal treatment consisted of cleaning and shaping combined with passive ultrasonic irrigation with sodium hypochlorite. Obturation of the root canal system was performed with cold obturation system, Guttaflow. A preoperative examination of radiographs and the internal anatomy of teeth are essential for the success of the treatment.

Introduction

The C-shaped canal system is an anatomical variation that may occur in mandibular first molars and maxillary molars but is most commonly found in mandibular second molars.[1-5] Typically, this canal configuration is found in teeth with fusion of roots either on its buccal or lingual aspect. In such teeth, the floor of the pulp chamber is usually situated deeply and may assume an unusual anatomical appearance.[6]

Roots containing a C-shaped canal in mandibular second molars often have a conical or square fused root and have a longitudinal radicular groove.[2,3] Manning[4] speculated that the failure of the Hertwig's epithelial root sheath to fuse on the lingual or buccal root surface was the main cause of a C-shaped root, which always contains a C-shaped canal.

Cooke and Cox1 were first to describe the clinical significance of C-shaped canals, which present a challenge with respect to their debridement and obturation. This is especially true when it is uncertain whether a C -shaped orifice found on the floor of the pulp chamber may continue to the apical third of the root. The presence of a high incidence of transverse anastomoses, lateral canals, and apical deltas in C -shaped canals makes it difficult to clean and seal the root canal system. Because of its challenging morphology, the C-shaped canal anatomy would increase the difficulty in root canal therapy and may account for the frequent occurrence of endodontic failure on this tooth.

The purpose of this case report is to present the root canal treatment of C shaped canal system in a second mandibular molar using a new obturation system Guttaflow.

Case Report

A 32-year-old female patient reported with the chief complaint of pain in the mandibular left second molar. .Medical history of the patient was noncontributory. Clinically, there was deep occlusal caries with pulpal involvement. The tooth was non responsive to vitality tests and was tender on percussion. Radiographically, radiolucency was seen involving pulp without any periapical changes.

After adequate anesthesia and isolation with a rubber dam, an access cavity was prepared. After pulp extirpation, the endodontic access cavity displayed three canal orifices joined to form a single C-shaped canal (Figure 2). The pulp chamber was irrigated with 5% sodium hypochlorite. Working length (WL) was determined using an electronic apex locator (Root Z X ® mini, J. Morita USA Inc.) and confirmed radiographically (Fig. 3).

C leaning and shaping was initiated with Protaper rotary files (DentsplyMalliefer) in the wider portion of the C-shaped canal, followed by circumferential instrumentation using hand instruments. During instrumentation, the canals were irrigated with 2.25% sodium hypochlorite, followed by saline, and final irrigation with 2% of Chlorhexidine for an antibacterial effect. After cleaning & shaping of the root canal system passive ultrasonic irrigation was done with Endoactivator (Dentsply Malliefer) to remove the infected tissue.

The canals were obturated using Guttaflow (Coltene Whaledent) and the preselected master cone. Guttaflow was manipulated according to manufacturer's instructions & used both as a sealer as well as an obturating material to fill the root canal system. A final radiograph was taken to establish the quality of the obturation.

After completion of root canal treatment, the tooth was restored with a posterior composite (P60; 3M Dental Products, St. Paul, MN) followed by a full coverage crown.

Discussion

A thorough understanding of root canal anatomy and morphology is essential for achieving high levels of success in endodontic treatment. Failure to recognize variations in root canal anatomy can result in unsuccessful endodontic treatment.

This case report highlights the unusual anatomy of a mandibular second molar with C-shaped canal configuration. Usually, mandibular first and second molars have similar canal morphology with 2 roots with 3 or 4 root canals. Anomalous canal morphology variations can be found in any tooth, and the mandibular second molar is no exception. In the present case, the access cavity morphology and the instrument radiograph suggested a C-shaped canal configuration.

C-shape configuration is known to present a complex canal anatomy where it is easy to retain residual pulp tissue, bacteria, and dentin debris, thus requiring supplementary effort to accomplish a successful treatment. Radiographic identification of this phenomenon is difficult. Most radiographs reveal radicular fusion or proximity, a large distal canal, a narrow mesial canal, and a blurred image of a third canal in between.[7] Fan et al. (2004) concluded that the transverse anatomy of a C-shaped canal system in mandibular second molar teeth might be predicted according to the radiographic appearance. New methods such as microscopy or endoscopy could be used to determine not only the existence but also the configuration of the entire C shaped canal system in mandibular second molars.

Passive ultrasonic irrigation may be advantageous in removing the infected tissues from the canal. The use of ultrasonic along with conventional therapy would be more effective. An increased volume of irrigant and deeper penetration with small instruments using sonics or ultrasonics may allow for more cleansibility in fan shaped areas of the C-shaped canals.[8] Thermoplasticized guttapercha technique is the recommended technique for the obturation of canal irregularities. In this case, we have used a cold filling obturation technique, Guttaflowwith excellent results.

Gutta-flow was selected to obturate the c-shaped canal system because of its several advantages:

- Ease of handling: It is a cold flowable

obturating material available in a capsule and can be directly injected into the root canal. It is used in combination with Master gutta-percha cone and doesn't require any form of manual compaction for placement.[9] Hence, there is no risk of vertical fracture due to undue forces and is relatively easy to use as compared to other systems.

- Better sealing ability: The material is believed to flow into lateral canals and completely fill the space between the master cone and the root canal wall. Good adaptability to root canal walls is because of its excellent flow & film thickness properties.[9] GuttaFlow is fairly stable & expands slightly on hardening.[10] This could be beneficial in preventing gap formation & decreasing micro leakage as Guttaflow has no chemical bonding to the canal walls.[11] Moreover, it is a cold flowable material, so there is no rise in temperature as seen with thermoplasticized materials hence there is no shrinkage on cooling.[12] Insolubility & homogeneity of the Gutta-Flow material are also factors contributing to its long term seal ability.[13,14]

Nevertheless, a keen sense of clinical acumen may go a long way in providing the correct identification and thereby instituting a better treatment.

Conclusion

Ambiguity in the canal morphology of the second molars is quite common. An astute clinician always looks for canal variations. Knowledge of possible variations in the internal anatomy of teeth is important for successful endodontic therapy

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Figure 1- Preoperative Radiograph

Figure 2- Access Opening

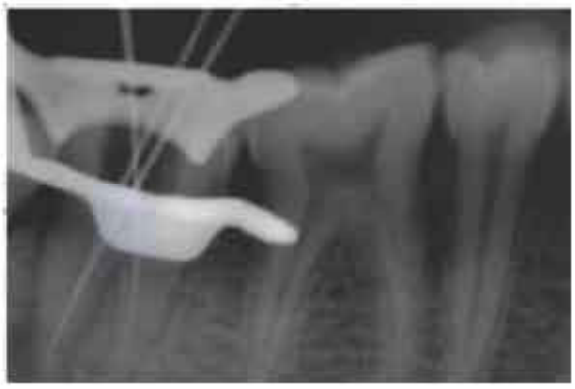

Figure 3- Working Length Determination

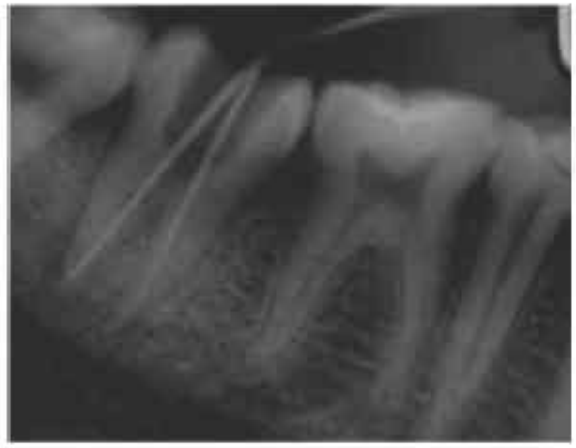

Figure 4- Master Cone Selection

Figure 5- Obturation with Gutta Flow

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Concept headings (include statistical methodology, if any)

Discussion

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