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CONTENTS

Review Article

Nutrition in maxillofacial prosthetic patients: The unexplored frontier

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A patient who undergoes/has undergone maxillofacial surgery is already under enormous apprehension and fear. Postoperative physical and mental stress because of depression, shock, anger and ostracisation add to functional and esthetic impairments and all these make the sufferer prone to malnourishment. An approach that involves simple nutritional principles preceding the surgery, continuing postoperatively and proceeding life long will translate into improved prosthodontic prognosis. We have attempted to apply these principles to solve the common nutritional problems affecting maxillofacial prosthetic patients, keeping in focus the diet and economics of a normal Indian patient.

Key words: Malnutrition, maxillofacial, nutrition prognosis

A patient undergoing maxillofacial surgery is under considerable physical and mental stress because of ostracization, anticipation of functional impairment, depression, shock and at times anger, which added to the stress of surgery, postoperative depression, functional impairment and facial disfigurement; all these make these sufferers prone to malnourishment. An approach incorporating the common nutritional principles from the diagnosis that continues life long may translate into an improved prosthodontic prognosis; this is because malnutrition results in impaired wound healing, reduced immunologic functions, increased susceptibility to infections, decreased tolerance to oncologic therapy[1] and increased internment.[2] In a review of 3000 patients with malignancies, De Wys noted significant impact of malnutrition on prognosis and stated that the patients with substantial weight loss had significantly shorter survival rates than those without significant weight loss.[3] The goals of an ideal nutritional therapy would be to provide adequate energy, proteins, fluid balance antioxidants, micronutrients and roughage to maintain the functional performance status, improve fitness for surgery and improve the overall prognosis.[2]

PRE-OPERATIVE PHASE

The assessment of nutritional status is designed to evaluate the balance of three aspects of nutrition *i.e,* energy, protein and micronutrients and has three components - nutritional history, appropriate physical examination with simple anthropometric measurements and laboratory studies to determine whether the patient requires nutritional support.[4]

Nutritional history includes the percentage ideal weight, percentage weight change, percentage usual weight and previous treatments, if any.[2] Weight should be recorded at every outpatient visit and daily for a hospitalized patient as the absolute body weight and change in body weight have prognostic implications.[4] Illness associated with a loss of 10-20% weight over a period of 6 months or less can cause multiple organ system involvement and if it exceeds 20%, protein energy malnutrition may occur.[4]. Physical examination includes body weight, height, triceps skin-fold thickness [Table 1] and mid-arm muscle circumference [Table 2]. Triceps skin-fold thickness is indicative of the body fat content whereas mid-arm muscle circumference indicates muscle mass and is more indicative of body protein.[4] Laboratory studies involve the measurement of serum albumin and transferrin. Their levels signify the ability of the liver to synthesize protein with changes occurring in advanced malnutrition. Albumin content should be more than 3.5 gm/dl; a level of 3.5

Table 1: Assessment of body fat as indicated by the 5th and 50th percentile of triceps skin-fold thickness (mm) by frame size and gender in an age group of 25-74 years

	Small frame		Medium frame		Large frame	
	5th	50th	5th	50th	5th	50th
Men	5	10	5	12	6	14
Women	10	20	12	24	16	32

Table 2: Assessment of muscle mass as indicated by the 5th and 50th percentile of mid-arm muscle area by frame size and gender (cm²)

Age	Small frame		Medium frame		Large frame	
	5th	50th	5th	50th	5th	50th
Men						
25-54	42	55	49	65	56	72
55-74	37	55	46	62	51	66
Women						
25-54	26	33	28	37	32	46
55-74	26	35	29	40	35	50

Table 3: Basal metabolic rate determined by Harris-Benedict equation

BMR (male)	66 + (13.7 × weight in kg) + (5 × height in cm) + (6.8 × age in year)
BMR (female)	66.5 + (9.6 × weight in kg) + (1.7 × height in cm) + (4.7 × age in year)
Calorie requirement	BMR × AF × IF
Protein requirement	6.25 × cal. required/150
Activity factor (AF)	Lying in bed BMR 1.2 Ambulatory BMR 1.3
Injury factor (IF)	Maintenance 0-30% Anabolic 40-60%

gm/dl may indicate a mild degree of malnutrition, whereas a count of 3.0 gm/dl or less may indicate severe malnutrition.[5]

Anthropometric and laboratory measurements are useful; however, the basis of nutritional assessment rests on history and physical examination[4] which therefore should be emphasized. Based on these assessment results, the indications for additional nutritional support are as follows:[6]

- Poor preoperative nutritional status (oral intake is less than 50% of the total energy requirement),
- Significant weight loss (body weight is less than ideal by more than 10%),
- An anticipated duration of Nil per orally for more than seven days (indicated particularly for total parenteral nutrition (TPN)) and
- Serum albumin values less than 3.0 gm/dl.

The patient is then categorized into ambulatory or nonambulatory; with maintenance diet or anabolic diet, respectively; subsequently, the caloric and protein requirement can be calculated by using various formulae and equations.[2,7] The Harris-Benedict formulae are preferred because of its simplicity [Table 3].

POSTOPERATIVE PHASE

In this phase, the utilization of the oral cavity for feeding may be hindered by the adverse effects of chemotherapy or radiotherapy or by the resection itself. Alternatives to oral feeding are nasogastric intubation, TPN, gastrostomy or jejunostomy.[8] If oral feeding can be resumed within a week of surgery, nasogastric intubation is indicated. In patients not expecting resumption around a month, TPN is preferred and gastrostomy/jejunostomy is indicated where long-term nil per orally is expected or in patients with swallowing disorders. The clinical uses with the complications of various extraoral routes of nutritional administration are summarized in Table 4. Once oral feeding is resumed, malnutrition is the common postoperative sequelae due to various complications; it is discussed with the possible solutions as follows:

- Loss of appetite may be caused by aguesia, xerostomia, mechanical dysphagia, depression or anger.[9] The possible solutions are as following:
  - Eat small amounts four to six times daily rather than three big meals.
  - Drink easy to swallow nutritious fluids like soups, milk shakes and curd.
  - Psychological counseling.
- Sore mouth may be caused by xerostomia and mucositis (due to depressed epithelial cell division).[9] This may be tackled by:
  - Avoiding salty or spicy food or food with rough texture.
  - Taking soft nonacidic, blended or liquid foods such as custards, pureed meats and cottage cheese.
  - Leaving dentures as long as possible out of the mouth (tissue rest).
- Diarrhea may occur secondary to radiotherapy or antibiotic therapy, infection or decreased masticatory ability.[10]
  - If diarrhea is caused by radiotherapy, antidiarrheals (prescribed by oncologist) may be necessary.
  - Drink plenty of fluids to replace the loss of water and electrolytes (oral rehydration therapy).
  - Have curd and bananas regularly.
  - Regular consultation with the physician.
- Xerostomia may be caused by radiation therapy and drugs, severing of salivary duct and gland (accidental or intentional), decreased liquid intake or stress and anxiety.[9]
  - Frequent liquid intake helps to keep the mouth moist.
  - Tongue coating (due to xerostomia) impairs the taste. To overcome this, clean the tongue two to three times daily with a bicarbonate soda solution.
  - Avoid sticky foods such as chocolates and pastries (cariogenic).
  - Use artificial salivary substitutes.
  - Boiled sweets stimulate saliva production.
- Constipation could be caused by lack of fiber in diet, stress and anxiety, muscle weakness or drugs.[10]

Table 4: Clinical uses C the complications of various extra oral routes of nutrition administration

Feeding technique	Clinical use	Potential complications
Nasogastric tube	Short-term clinical situations (weeks) or longer periods with intermittent insertions	Aspiration; ulceration of nasal and esophageal tissues, leading to stricture
Gastrostomy tube	Long-term clinical situation, swallowing disorders or impaired small-bowel absorption requiring continuous drip	Aspiration; irritation around tube exit site peritoneal leak
Jejunostomy tube	Long-term clinical situation where impaired gastric emptying	Clogging or displacement of tube; jejunal fistula if large tube is used; diarrhoea
Total parenteral nutrition	Immediate postoperative phase; obstruction of GIT; impaired swallowing	Mechanical - thrombus, embolism; metabolic - fluid and electrolyte derangement; infections - catheter-induced sepsis, exit-site injections.

- Induct fibers (roughage) in diet; good sources include whole-wheat cereals, whole-wheat breads, green vegetables, etc.
- Natural remedies for constipation includes figs, papaya and drinking eight to ten glasses of water in copper utensils.[11]

CONCLUSIONS

Malnutrition is a reality that a maxillofacial prosthetic patient may face throughout his life; its causes vary from depression to functional impairment. As part of the rehabilitation team of such a patient, it is the duty of a prosthodontist to be aware of the significance of nutrition, recognize signs and symptoms of malnutrition, manage simple nutritional problems and refer the patients to competent personnel, if required. Adopting such an approach would improve the prognosis of both the patient and prosthesis.

REFERENCES

1. Copeland EM, Ellis LM. Nutritional management in patient with head and neck malignancies. *In*: Management of head and neck cancer: A multidisciplinary approach. 2nd ed. JB Lippincott: Philadelphia; 1994. p. 193-201.
2. Dudrick SJ, Brown W, Biggs CG. Nutrition management of patient with head and neck tumors. *In*: Comprehensive management of head tumors. 2nd ed, vol. 1. Saunders: 1999. p. 45-58.
3. Dewys WD, Begg C, Lavin PT, Band PR, Bennett JM, Bertino JR, *et al*. Prognostic effect of weight loss prior to chemotherapy in cancer patients. Eastern Cooperative Oncology Group. Am J Med 1980;69:491-7.
4. Wilson JD, Danke M. Assessment of nutritional status. *In*: Harrison's principles of internal medicine. 14th ed. McGraw Hill: 1998. p. 448-52.
5. Park K. Nutrition and health. *In*: Preventive and social medicine, 18th ed. Bhanot: 2005. p. 438-87.
6. Tawa NE, Maykel JA, Fisher JE. Metabolism in surgical patients. *In*: Textbook of surgery: The biological basis of modern surgical practice. 17th ed, Elsevier: 2005. p. 137-82.
7. Daly JM, Duderick SJ, Copeland EM. Nutritional management of patients with head and neck malignancies. *In*: Cancers of head and neck. 1st ed. Churchill Livingstone: 1981. p. 63-89.
8. Howard L. Entral and parentral nutrition therapy. *In*: Harrison's principles of internal medicine. 14th ed. McGraw Hill: 1998. p. 472-80.
9. Epstein J. Oral cancer. Burket's Oral medicine. Diagnosis and treatment. 4th ed. Lippincott-Raven: 2000. p. 203-34.
10. Freidman LS, Isselbacher KJ. Diarrhoea and constipation *In*: Harrison's principles of internal medicine. 14th ed. McGraw Hill: 1998. p. 236-44.
11. Sarwate N. Eating problems, constipation and Diarrhoea. *In*: Diet and the cancer patient. 1st ed. JASCAP: 2005. p. 12-20.

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