Malnutrition In Aging

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Abstract

Malnutrition is a common, potentially serious, and frequently under-diagnosed condition among elderly individuals. Age-related physiologic changes in combination with organic and psychological disease processes contribute to the development of malnutrition in older adults. Profound malnutrition and serious illnesses often present concurrently, and each can accelerate the progression of the other. The importance of early detection and aggressive intervention is of utmost importance to arrest the downward spiral. Prompt diagnosis relies on a high index of suspicion and available screening tools. Once diagnosed, the underlying causes must be ascertained and treatment rapidly instituted. This article reviews the prevalence and effects of malnutrition in the elderly. Changes in food intake and body composition with aging are addressed, and the physiologic and pathologic causes of anorexia and weight loss in the elderly population are explored. The most commonly used screening tools for malnutrition in the elderly are discussed, along with non-pharmacologic and pharmacologic measures for treatment.

Protein energy malnutrition (PEM) is a common, potentially serious, and frequently under-diagnosed condition among elderly individuals.

Physiologic changes of aging interact with disease processes to place the elderly at increased risk for malnutrition.

Diagnosis of malnutrition is based on history taking, physical examinations and lab evaluation, and may be aided by nutritional screening tools.

Nutritional therapy is an important component in the management of malnourished individuals and when indicated, should not be delayed.

INTRODUCTION

Protein energy malnutrition (PEM) is a common, potentially serious and frequently under-diagnosed condition among elderly individuals. As humans age there is a physiological decrease in food intake that occurs to counterbalance the age-related decline in physical activity and resting metabolic rate. This has been referred to as the "anorexia of aging". [1] This physiological anorexia increases the risk of developing pathological anorexia and weight loss when an older person develops a physical or psychological illness. Left untreated, anorexia and weight loss is associated with great morbidity and mortality in older adults. Community-dwelling elderly with PEM may exhibit reduced performance in the basic and instrumental activities of daily living as well as an increased incidence of hip fractures.[2] In the nursing home, PEM is associated with pressure ulcers, cognitive impairment, postural hypotension, infections, and anemia.[3] Its presence in hospitalized elderly patients has been linked to prolonged hospital length of stay, increased in-hospital mortality, and the development of various complications such as infections and pressure ulcers.[4,5,6,7]

The treatment of PEM has been shown to improve hospitalization outcomes in both surgical and medical elderly patients, with decreased mortality, morbidity and length of hospital stay. [8,9,10,11] These findings emphasize the importance of detecting and treating PEM in elderly patients. Many patients, however, never have their nutritional status appropriately evaluated while they are hospitalized. [12,13,14] In addition, hospitalized elderly patients are frequently allowed to remain on inadequate nutrient intake, [13,14] and even when nutritional problems are identified, adequate nutritional support is rarely provided. [15]

PREVALENCE OF MALNUTRITION

The prevalence of PEM varies greatly with the population studied and the criteria used to define malnutrition. It is estimated that up to 15% of community-dwelling and ambulatory elderly persons, [16] and 5% to 44% of homebound patients [17,18] are malnourished. The prevalence increases to 20% to 65% in hospitalized patients[19,20,21,22,23] and 23% to 85% in nursing home residents.[24,25,26] The point prevalence of PEM on admission to a long-term care facility was estimated at 54% in one study,[27] and 60% of residents showed a net weight loss following admission to an academic nursing home.[28] Blaum et al[29] report that approximately 10% of nursing home residents lost 5% of their weight within one month of admission, or 10% of their weight within six months. Nutritional compromise, however, need not be a necessary consequence of long-term care. Abbasi et al[30] report that nursing homes with aggressive evaluation and treatment policies for malnutrition had lower prevalence and fewer complications of PEM compared to nursing homes without such policies. Nutritional supplementation has been shown to improve the prevalence and outcome of PEM in long-term care facilities, with 50% of malnourished residents gaining weight and 63% showing improvement in PEM diagnostic criteria.[27]

This wide range of estimates for PEM reflects the plasticity and multitude of diagnostic criteria used to screen for and detect malnutrition, as well as the lack of a "gold standard" to establish the presence and degree of malnutrition. Over the past decade, efforts have been made to standardize and cross validate screening and diagnostic tools based on clinical outcomes and controlled prospective studies.

EFFECTS OF MALNUTRITION IN THE ELDERLY

Based on animal studies and human investigations, it is known that malnutrition can adversely affect virtually every organ system.[31] The extent of the clinical manifestation of malnutrition is related to the duration and the degree of nutritional compromise. The most striking clinical manifestations include delayed wound healing, development of pressure ulcers,[32,33,34] susceptibility to focal and systemic infections,[35,36,37] functional decline,[38,39] cognitive decline,[40] and delayed recovery from acute illness.[41,42] Hospitalized and malnourished elderly patients have nearly four times the risk of developing delirium as do those who are not malnourished.[43] Most manifestations are reversible with appropriate nutritional support, but with prolonged and profound malnutrition, clinical deterioration supervenes,

culminating in irreversible organ damage and ultimately death. Profound malnutrition and serious illnesses often present concurrently, and each can accelerate the progression of the other. The importance of early detection and aggressive intervention is of utmost importance to arrest the downward spiral. Prompt diagnosis relies on a high index of suspicion and available screening tools.

CHANGES IN FOOD INTAKE AND BODY COMPOSITION WITH AGING

There is evidence from both cross-sectional[44,45,46] and longitudinal[47,48] studies that there is an increase in lean body mass and percentage of body fat in both men and women up to the age of 70 years. This is followed by a decline in both lean body mass and body fat. Data from the third National Health and Nutrition Examination Survey (NHANES III)[49] as well as other studies[50,51,52,53] clearly demonstrate a linear decline in food intake from the age of 20 to 80 years in both men and women. The average decrease in food intake was 1321 calories in males and 629 calories in females.[54] This decrease in food intake was predominantly due to a decrease in fat intake.[44] In the study by Wurtman et al,[52] older persons ate 55% less fat and 40% less carbohydrate than younger individuals. Protein consumption was equivalent in both age groups. Older persons were also less likely to snack between meals. Rolls et al[54] found that older persons consumed less calories over a single meal compared to younger persons. However, when given a yogurt preload, older subjects were likely to overeat compared to younger subjects, suggesting a failure of normal energy-setting mechanism that operate in younger persons. In another study by the same group, it was found that, in contrast to the young, older persons fail to develop sensory-specific satiety.[54]

Several investigators have demonstrated that older persons develop dysregulation of food intake based on internal cues.[55,56,57] Cook et al[58] found that following an overnight fast, older persons were less hungry and had less desire to eat than younger individuals. Clarkston et al[55] found that fasting older individuals were less hungry, and after a standardized meal they demonstrated a higher level of satiation than did younger persons. Utilizing two-day food diaries, de Castro[56] compared 3,007 healthy adults aged 20-80 years and reported that older subjects ate less but drank similar amounts of fluids compared to younger controls. They were likely to eat smaller meals and they tended to eat their meals at a slower pace. Hunger was an equal driving force for food intake in younger and older

subjects. Roberts et al[57] examined the effect of overfeeding or underfeeding in young and older subjects for 21 days. Following overfeeding, younger males decreased their food intake while older males failed to demonstrate this spontaneous hypophagia. This resulted in the younger men returning to their pre-experimental weight, while older men failed to lose weight. Following underfeeding, young men developed hyperphagia and regained the lost weight, while older persons failed to increase food intake and failed to regain the body mass lost during underfeeding.

ETIOLOGY OF THE PHYSIOLOGICAL ANOREXIA OF AGING

The physiological decrease in food intake with aging, referred to as anorexia of aging, may be attributed to several factors. Older persons show multiple changes in taste sensation. Gustatory papillae atrophy has been demonstrated to occur in humans from middle age onward.[59] Taste threshold tends to increase with advancing age, with sweet taste being less affected than other modalities.[60] Average taste-detection threshold for older persons varies across the different taste modalities, with salt showing the greatest increase. There is no connection, however, between taste detection threshold and food consumption.[61,62] Schiffman et al[63] found that while in some instances the decline in enjoyment of food seen in older persons was reversed by the use of flavor enhancers, there was no net increase in caloric intake.

There is a marked decline in the ability to smell with aging.[64] Older subjects, when blindfolded, have approximately half the ability of younger subjects to recognize blended foods.[65] This olfactory dysfunction is more marked in patients with Alzheimer's disease[66] as well as those with Parkinson's disease.[67] The changes in smell sensation with aging were related to less interest in food-related activities and to a greater intake of sweets.[68]

In addition to changes in taste and smell, aging is associated with several changes in both the central feeding system and the peripheral satiety system. Animal studies have demonstrated a decrease in the endogenous opioid feeding drive with aging,[69,70] which is attributed to the reduction in opioid receptors that occurs with aging.[71] As endogenous opioid predominantly drives fat intake,[71] this finding is in keeping with the fact that the decrease in food intake with aging is predominantly due to a decrease in fat intake.[49] In addition, animal studies have shown an increased satiating effect of cholecystokinin in older animals compared to younger ones.[73] In humans, cholecystokinin levels were found to be elevated in older malnourished persons, suggesting that this compound may play a role in the maintenance of anorexia in older persons.[74] Neuropeptide Y has been demonstrated to stimulate food intake less in older rats compared to younger rats[75] but not mice.[76] The effectiveness of other neurotransmitters on modulating food intake does not appear to change with age.[77]

Leptin concentrations do not appear to be dramatically altered with aging and are more closely related to body fat levels.[78] In humans, increases in body fat were generally accompanied by an increase in leptin levels.[79] Perry et al[79] found an increase in leptin levels at middle age in women, followed by a decline in older women. A fifteen year longitudinal study in aging individuals found that in males, but not in females, leptin concentrations declined at a slower rate compared to the rate of body fat decline.[80] Testosterone administration in older males decreases leptin concentrations,[81] and testosterone concentrations decline longitudinally with aging.[82] These findings suggest a possible role for leptin in producing the psychological anorexia of aging in males, but not females.

With aging, a decline in gastric emptying of large meals has been associated with satiation.[83] It appears that there is a decreased adaptive relaxation of the fundus of the stomach, resulting in more rapid antral filling. Nitric oxide release causes adaptive relaxation. There is a decrease in gastric nitric oxide synthase in older animals with aging.[55] In humans, infusion of glyceryl trinitrate resulted in dilation of the fundus of the stomach and thus longer retention of the food in the fundus.[84] These findings support the concept that decreased adaptive relaxation of the gastric fundus may significantly contribute to early satiation in older persons.

CAUSES OF PATHOLOGICAL ANOREXIA AND WEIGHT LOSS

The causes of anorexia and weight loss in the elderly are numerous. These causes can generally be classified into three major groups: social, psychological, and physical.

Social causes--Poverty is by far the major social cause of anorexia and weight loss in the elderly.[85]A common, but often unrecognized, cause of poverty is iatrogenic. When physicians prescribe expensive medications, older persons with limited resources often reduce their food budget to afford their medications. Social isolation due to death of family and friends is another important cause of anorexia

and weight loss in the elderly.[86]de Castro et al[87] found that socialization results in increased food intake over a meal. Elder abuse, occurring in up to 5% of older persons, can result in anorexia secondary to distress or by deliberate food deprivation by the caregiver.[88]

Other social causes include inability to shop, cook, or feed oneself. Two percent of persons aged 65-84 years require assistance with feeding. This figure rises to 7% for persons aged 85 years or older. In the 75 to 84 years age group, 12% need help managing their finances, 16% need help with food preparation, and 29% need assistance with shopping.[89] In nursing homes, failure to pay attention to ethnic food preferences may result in food refusal and anorexia.[90]

Psychological causes--Depression is one of the most important treatable causes of weight loss in older persons. In the outpatient setting, depression has been shown to be one of the most common causes of weight loss in older adults.[91] In nursing home settings, depression was consistently recognized as a major cause of weight loss and failure to thrive among residents.[92,93,94] Depression is associated with increased corticotropin releasing factor, a potent anorectic agent, in the cerebrospinal fluid.[95,96] In addition, depressed patients have many symptoms that can lead to weight loss, including weakness (61%), stomach pains (37%), nausea (27%), anorexia (22%), and diarrhea. (20%)[97] Successful treatment of depression has been shown to reverse weight loss in nursing home residents.[98]

Dementia is commonly associated with weight loss.[99,100] Older persons with dementia often forget or refuse to eat, and feeding can become a time-consuming process. Excessive wandering, psychotropic medications, paranoid ideations, and associated depression are other implicated factors. Some patients with dementia develop apraxia of swallowing and must be reminded to swallow after each mouthful of food.[85] Late-life paranoia, later-life mania, and anorexia nervosa are other psychological conditions that may contribute to malnutrition in older persons.[101]

Physical causes--Numerous medical conditions can result in anorexia and weight loss in older persons. Most of these conditions cause weight loss by one or more of the following mechanisms: hypermetabolism, anorexia, swallowing difficulty, or malabsorption. Oral disease can lead to a decrease in energy intake of about 100 kcal/day.[102] Swallowing disorders are associated with increased risk of aspiration and food aversion, which may be conscious or subconscious. Diseases that interfere with the ability of the person to eat or to prepare food, such as stroke, tremors, or arthritis, can all lead to decreased food intake.

Infections are an important cause of weight loss in older persons, especially those residing in a nursing home. It is estimated that the average nursing home resident acquires a new acute infection every three months.[103] Infection may result in confusion, anorexia, and negative nitrogen balance, all of which may contribute to anorexia and weight loss.[104] Persons with chronic obstructive pulmonary disease experience a decrease in arterial oxygen tension when eating due to the thermic energy of eating and the brief interruption of respiration with swallowing. They frequently are unable to complete their meals due to dyspnea.[105] Their weight loss is further aggravated by hyperventilation and use of accessory muscles, leading to increased metabolism.[106] Acquired immunodeficiency syndrome (AIDS) and rheumatoid arthritis result in increased levels of circulating cytokines which in turn lead to increased resting energy expenditure and decreased serum albumin levels.[107] Hyperthyroidism,[108] Parkinson's disease,[109] and pheochromocytoma[110] cause hypermetabolism and may result in weight loss. Pancreatic insufficiency and gluten enteropathy may cause weight loss through malabsorbtion.

Numerous medications are associated with weight loss. Those most frequently implicated include digoxin, theophylline, nonsteroidal anti-inflammatory drugs, and psychotropic drugs such as fluoxetine, lithium and phenothiazines. Therapeutic diets are often unpalatable and poorly tolerated by older persons, leading to weight loss. In nursing homes, diabetic diets appear to have no effect on diabetic control.[111] Therapeutic diets, including low salt, low fat, and sugar-restricted diets should be avoided in the elderly.

DIAGNOSING MALNUTRITION

Nutritional assessment in an older person should involve taking a thorough history and physical examination in addition to anthropometric and biochemical measures. A carefully obtained history is the most valuable tool for identifying persons at risk for malnutrition. Weight change over time is one of the most important aspects of the history. Unintentional weight loss of 10 pounds or more over a period of 6 months is a strong indicator of nutritional risk and morbidity.[112] A dietary history includes providing the patient with a simple questionnaire (food diary) that inquires into quantity as well as quality of food intake. The history should also ascertain the presence of risk factors for

deficient nutrition intake such as poverty, social isolation, and inability to shop, prepare food, or feed.[3] Additionally, any chronic medical condition that may potentially affect nutritional status must be documented, such as diabetes, cardiopulmonary disease, cerebrovascular disease, gastrointestinal conditions, depression, dementia, and rheumatological disease. Acute illnesses may demand increased nutritional requirements, and the frequency and severity of such events must be noted. Review of both prescription and over-the-counter medications is essential to avoid polypharmacy. Many commonly used drugs are anorexigenic, notably digoxin, theophylline, non-steroidal anti-inflammatory drugs (NSAIDs), and psychotropic drugs such as fluoxetine, lithium and phenothiazines.[113] A comprehensive list of potential drug offenders can be found at http://ltcnutrition.org.

The physical examination should determine general body habitus, present body weight and height, and the presence of any sign of nutritional deficiency in the skin, hair, nail, eyes, mouth, or muscles. The body mass index (BMI) is a useful measurement for assessing nutritional status and can be calculated using the formula (BMI= Weight (kg)/ [height (m)]^2). The association between BMI and mortality in older adults follows a J-shaped curve, unlike the U-shaped curve relationship in younger adults.[114,115] Data from several studies of elderly aged 60-90 years indicate the lowest mortality occurred at progressively increasing body weight,[116] and higher mortality occurred with lower body weight.[117] The desired BMI for older people is 24 to 29, compared with 20 to 24 in younger persons, and a measure below 24 is an indicator of malnutrition in older persons.[118] BMI, however, may not be as informative in the elderly as it is at younger ages. There is little documentation relating BMI to direct measurements of body composition in the elderly, especially at very old ages or in non-caucasian ethnic groups. In addition, stature often cannot be measured accurately in the elderly individuals because of increased prevalence of spinal curvatures, which is reported to be as high as 30%.[119] For such individuals, the estimation of stature from knee height is probably the best method for providing this information.[120] Knee height has been measured in the Third National Health and Nutrition Examination Survey, or NHANES III, for persons 60 years of age or older.

Other anthropometric methods include measurements of arm circumference, mid-arm muscle area, calf circumference, triceps skin-fold, and subscapular skin-fold thickness. Calf circumference has been recommended as a more sensitive measure of the loss of muscle mass in the elderly than arm circumference and midarm muscle area.[119] Skin-fold thickness is frequently used to assess body fat stores. The accuracy of this technique in nutritional evaluation is hampered by the unpredictable response of subcutaneous fat to undernutrition and the absence of a definite correlation between skin-fold thickness and total body fat. In older men, skin-fold thickness over the scapula and iliac crest have been found to correlate most closely with total body fat, while the triceps and the thigh are the preferred measurement sites in older women.[121]

LABORATORY EVALUATION

Serum albumin level is the most frequently utilized biochemical marker for malnutrition. With a half-life of approximately three weeks, albumin is a good indicator of baseline nutritional status but is less useful in assessing effectiveness of acute nutritional intervention. Furthermore, cytokines and postural changes, commonly present in acute illness, may result in lower albumin levels. Cytokines such as tumor necrosis factor, interleukin-2 and interleukin-6 inhibit synthesis of albumin at the gene level[122,123] and may facilitate extravasation of albumin from the intravascular to the interstitial space.[124,125] The dilution effect of chronic recumbency is associated with increased intravascular volume and may diminish measured albumin by as much as 0.5 mg/dL.[126] These factors, in part, explain the rapid decline in serum albumin levels (beyond what is expected from diminished nutritional intake) shortly after an elderly person is hospitalized.[127] Nonetheless, albumin levels less than 3.5 mg/dL are strongly suggestive of PEM,[128] and levels less than 3.2 mg/dL are excellent predictors of mortality and morbidity in the elderly. There is a 24% to 56% increase in the likelihood of dying for every decline of .35mg/dL in serum albumin.[129]

Serum cholesterol level is another biochemical marker of malnutrition. Serum levels less than 160 mg/dL suggest low lipoprotein levels, and thus low visceral protein. Rudman et al1[130] showed cholesterol levels below 160 mg/dL to be highly predictive of subsequent mortality in a cohort of nursing home residents, and even lower levels were correlated with a ten-fold increase in mortality. A decrease in cholesterol levels from above 160 mg/dL to less than 120 mg/dL during acute hospitalization has been associated with increased length of stay, complications, and mortality.[131] Hypocholesterolemia, however, develops later in the progression of malnutrition, so its value as a screening tool

is limited.

Total lymphocyte count (TLC) is another useful screening test. Selzer et al[132] reported a four-fold increase in mortality with a TLC of less than 1500 cells/mm. Levels less than 800 cells/mm indicate severe malnutrition.[133] Clinically, this is reflected in suppressed cellular immunity, as evidenced by delayed cutaneous hypersensitivity testing with common antigens such as Candida. Specifically, the CD4 cell count has been noted to drop with progressive malnutrition,[134] and the CD4:CD8 ratio declines, as occurs with HIV patients. The relative immune compromise is reversed with nutritional support, but, left untreated, may progress to sepsis and death. As with hemoglobin, a low white blood cell count may be related to specific nutrient deficiencies such as folate, vitamin B12, and iron.

Proteins with a shorter half-life than albumin are occasionally used to assess acute response to nutritional intervention. Prealbumin, with a half-life of two days, and retinol binding proteins, with a half-life of two hours, fit this criterion. Leptin, a protein produced by fat cells, is a good marker of total body fat. It is being studied and validated as a nutritional marker but is affected by testosterone levels, age, and gender. It is important to note that all these tests are affected by non-nutritional factors and none alone is adequately sensitive or specific to diagnose malnutrition.

SCREENING TOOLS

Since no single physical finding, historical fact, or biochemical test in itself is a sufficient predictor or determinant of malnutrition, several screening tools have been developed to better document and monitor PEM. The most common and best-evaluated are discussed below.

The Instant Nutritional Assessment (INA)-- The INA is one of the simplest and most practical nutrition screening tools. It was introduced by Seltzer and coworkers[135] in 1997, and is widely used. It combines three easily obtainable elements – lymphocyte count, albumin, and weight change. This test is often referred to as "LAW", the first letter of each item. While each item alone may have low predictive value, used together the three identify individuals at risk for malnutrition with a high degree of accuracy.

The Subjective Global Assessment (SGA)-- The SGA differs from the INA in that it does not use laboratory criteria but relies heavily on functional capacity and physical signs of malnutrition. Specifically, it combines information from the patient's history (such as weight loss, dietary intake,

functional status), physical examination (such as muscle and fat distribution, edema), and the clinician's judgement. As such, it is highly dependent on the screening clinician for accuracy. On initial validation, its ability to predict infection as a complication of malnutrition was compared to six other independent methods (including albumin and anthropometric measures). The SGA was found to be 82% sensitive and 72% specific,[136] and outperformed all six methods. However, when this study was repeated with less experienced clinicians, the results were much less promising.[137] Other studies have also led to the conclusion that the SGA is only reliable in the hands of well-trained clinicians.

The nutritional screening initiative and the DETERMINE checklist-- The DETERMINE checklist was developed by the Nutritional Screening Initiative (NSI), an interdisciplinary multiorganizational effort aimed at introducing nutritional screening into the American health care system.[138] The DETERMINE Your Nutritional Health Checklist is a self-administered list of ten questions covering different risk factors for malnutrition. Four questions cover dietary concerns, four questions cover general health assessment, and two questions cover social and economic issues. Each question is scored according to its importance as determined by the developer of the checklist. Patients with a total score of six or higher (highest score is 21, with higher being worse), are directed to various follow up and assessment.

The DETERMINE Checklist was developed as a screening, education, and public awareness tool. It is not a reliable diagnostic tool, as a high score was shown by Sahyoun et al[139] to be a weak predictor of mortality. It has shown somewhat better predictability as a screening tool in retrospective and prospective validation studies. This tool has found widespread use; one of its best attributes is in promoting public awareness of malnutrition.

The malnutrition risk scale (SCALES)--The malnutrition risk scale was developed by Morley et al[140] as an outpatient screening tool. The acronym SCALES represents the six elements in this screening tool (Sadness, Cholesterol, Albumin, Loss of weight, Eating problems, and Shopping) that cover common known risk factors for malnutrition, including depression, which has emerged as a major risk factor for malnutrition and death,[141] but is often overlooked. The SCALES screening does not include functional or physical assessments, and therefore the user

does not need to be a trained or experienced professional. A score of three or higher suggests high risk for malnutrition.

The Mini-Nutritional Assessment (MNA)-- The MNA[142] is a simple, rapid, and reliable tool for assessing nutrition in the elderly and has rapidly become the screening tool of choice for many geriatric clinicians. It is frequently used in the nursing home setting and is composed of 18 items that require a professional to administer. It requires 10-15 minutes to complete and does not require laboratory tests. It consists of four sections: anthropometric, general, dietary, and self-assessment. The MNA was shown to be 98% accurate when compared with a comprehensive nutritional assessment which included food records and laboratory tests.[143] In another study, there was no added benefit in adding biochemical measurements, as the test was highly accurate with or without these tests.[143]

MANAGEMENT OF ANOREXIA AND WEIGHT LOSS

The cornerstone in management of anorexia and weight loss is early detection and prompt treatment of reversible disorders. The major treatable causes of weight loss are summarized in table 1.[144,145] Special attention should be given to treating depression and eliminating anorexogenic medications. Dietary restrictions should be eliminated when possible, with the diet liberalized to patient preferences. Delivering hot meals through programs such as Meals on Wheels and providing feeding assistance to patients with disabilities or dementia often helps maintain food intake to adequate levels. Older patients with dysphagia can often be taught by a speech pathologist the correct swallowing techniques and positioning for swallowing safely. Dietary manipulation, such as thickened liquids, is an important component of dysphagia management.

Table 1: Commonly encountered reversible causes of anorexia and weight loss in older persons

- Polypharmacy
- Depression
- Alcoholism
- Swallowing disorders
- Poor dentition
- Poverty
- Hyperthyroidism
- Hyperparathyroidism
- Hypoadrenalism
- Malabsorption
- Inability to feed
- Therapeutic diets
- Dementia (excessive wandering, and paranoia)
- Infections

Nutritional therapy is an important component in the management of malnourished individuals. Nutrition therapy can take one of three forms: oral caloric supplementation, tube feeding, or parenteral feeding. Numerous oral and enteral feeding formulas are available and differ in source and percent proteins and fat, lactose content, osmolality, calorie per unit volume, and cost. There is emerging evidence that oral supplementation improves outcome in elderly persons with hip fractures,[146] pressure ulcers,[147] and pneumonia.[148] In some nursing homes, "medication pass" supplementation is practiced. This consists of providing liquid caloric supplementation at the time medications are passed, and in the malnourished elderly such a practice may increase the daily caloric intake by up to 15%. Most oral formulas provide 1 kcal/ml, and the total amount of calories consumed is simply the volume, in milliliters, consumed.

In cases where metabolic demand exceeds what can be met by oral intake alone (e.g. cancer cachexia) or with mechanical problems (e.g. esophageal obstruction, endotracheal intubation, neuromuscular disease, or orofacial surgery), a brief course of tube feeding may be indicated. Access to the gut is achieved by a nasogastric (NG) or nasointestinal tube, or a percutaneous gastric (PEG) or percutaneous intestinal (PEJ) tube. Aspiration of gastric content is the most serious complication of feeding tubes, and is very common, even with aspiration precautions. As much as 40% of deaths related to tube feeding are due to aspiration pneumonia, with aspiration occurring in 44% of patients with NG tubes, and 56% of patients with PEG tubes in a long-term care setting.[149] Duodenal tubes do not provide added protection against aspiration. In fact, a false sense of security with feeding tubes that traverse the pylorus may lead to relaxation of reflux precautions, increasing the risk of aspiration. Medications that decrease the lower esophageal sphincter or delay gastric emptying must be

avoided if possible.

In a study of 1386 nursing home residents with cognitive impairment and malnutrition, Mitchell et al[150] found no evidence that tube feeding prolonged survival. In addition, Weaver et al[151] found no improvement in the quality of life or morbidity in tube-fed patients. Tube feeding candidates must therefore be selected carefully, and a return to oral feeding must occur as soon as possible. Similar concerns surround the use of central or peripheral parenteral feeding. Parenteral feeding should be limited to relatively brief periods of time and is restricted to individuals with a nonfunctional gut. It is of benefit in acute management of pseudomembranous colitis, acute pancreatitis, or a severe flare-up of Crohns disease to rest the gut while recovery occurs. Metabolic parameters and electrolytes must be monitored closely. Parenteral nutrition has no place in the management of chronic age-related malnutrition.

Several medications have been suggested for the treatment of anorexia and weight loss in older persons (table 2). Megestrol acetate has been used successfully to stimulate appetite and promote weight gain in patients with AIDS[152] and cancer.[153] Megestrol acetate, dosed at 160 mg daily, was shown to prevent nutritional deterioration in older males with head and neck cancer receiving either radiation or chemotherapy.[154] Administration of megestrol acetate to elderly malnourished nursing home residents resulted in mild weight gain but was associated with a variety of side effects including delirium, megacolon, edema and congestive heart failure.[155]

Growth hormone has been shown to stimulate weight gain in severely malnourished older patients.[156,157] Growth hormone is extremely expensive, however, and treatment for more than six months has been associated with a variety of side effects including arthralgias, carpal tunnel syndrome, and gynecomastia.[158,159] The use of growth hormone to treat intensive care unit patients with severe malnutrition resulted in increased mortality.[160] Oxandrolone, an oral anabolic steroid with potent anabolic activity and minimal androgenic activity, was shown to have a positive impact on weight gain in patients with AIDS[161] and alcoholic hepatitis.[162] Nandrolone, another anabolic steroid, improved nutritional status in patients with renal failure.[163] Testosterone increased muscle strength and decreased leptin levels in older persons.[164] In another study, it decreased fat mass and increased muscle mass.[165]

Table 2: Drugs available for the treatment of anorexia and weight loss

- Megestrol acetate

- Oxandrolone

- Testosterone

- Cyproheptadine

- Dronabinol

- Metoclopramide

Metoclopramide, a prokinetic agent, has been used to treat early satiation and anorexia. It was also found to stimulate appetite in persons with anorexia caused by the cancer-associated dyspepsia syndrome.[166] Its use, however, may result in dystonic reactions and worsening of parkinsonian symptoms. Cyproheptadine, an antiserotonergic agent, has been shown to have a mild positive effect on appetite in malnourished adults.[167] Duranabinol (tetrahydrocannabinol) is an antiemetic that promotes food intake. It has been shown to promote mild weight gain in patients with cancer or AIDS[168] and stimulate weight gain when administered to patients with Alzheimer's disease.[169] Adverse effects include euphoria, somnolence, and fatigue.

CONCLUSION

Malnutrition in the elderly is a common problem albeit under diagnosed and when diagnosed is often undertreated. Early detection is the key to management of malnutrition. Older persons experience physiological anorexia in response to decreased metabolism and physical activity. This places them at increased risk for developing malnutrition when a disease process occurs. The majority of causes of anorexia and weight loss in older persons are treatable. The cornerstone to proper management of malnutrition in the elderly is early detection and prompt treatment of reversible causes. Nutritional assessment and screening should be an integral part of the overall care of the elderly. The diagnosis of malnutrition should not be based on a single marker. A thorough history and physical examination, in conjunction with anthropometric and biochemical measures should be utilized. The use of nutritional supplementation, when indicated, should not be delayed. Although several potential drugs have been suggested for the management of anorexia and weight loss, none of these appear to be sufficiently cost effective for routine use, or sufficiently tolerated for long term use.

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