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Optimizing Nutrition in the Elective Surgical Patient

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Disclosures

- I have no potential conflicts of interest to disclose for this talk!

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Objectives

- Describe common complications of malnutrition, and the effects on surgical outcomes.

  Evaluate approaches to take a nutrition focused history in the perioperative period, and describe physical exam findings indicative of malnutrition.

  Interpret diagnostic study findings related to malnutrition and surgical recovery.

  Develop an individualized therapeutic nutrition plan to optimize surgical recovery and outcomes.

  Describe nutrition interventions to support commonly encountered feeding difficulties after surgery

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Focus

- Adult patients
- Elective, non-emergent surgical procedures
- Will take a general look at surgical patients

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Outline

- Background and definition of malnutrition
- Response to surgical stress
- Nutritional evaluation
- Management
- Post-op trouble shooting

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Background

- Malnutrition is a strong independent risk factor for poor surgical outcomes
- Malnourished patients have significantly greater risk of morbidity, mortality and length of hospital stay post surgery
  - 3x greater likelihood of a complication, 5x more likely to die
- Malnourished patients are more frequently readmitted following surgery as compared to well-nourished counterparts
  - Twice as likely within 30 days s/p colorectal surgery

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Background

- Not all patients at the same risk
- Highest risk of baseline malnutrition → GI and oncologic surgical patients
  - 2/3 of GI surg patients are malnourished at baseline
- 50% of patients admitted to the hospital are considered malnourished
- Only 1 in 5 patients receive a pre-op nutrition intervention
  - Including nutrition consultation

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Background

- With adequate perioperative nutrition
  - Reduced morbidity (up to 20% in malnourished GI surg patients)
  - Reduced mortality
  - Reduced infections
- Adequate post-op nutrition, delivered beginning on the first day of oncologic surgery, independent predictor of increased rates of 5-year survival

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Physiologic effects of surgery

- Surgery elicits similar reaction as other tissue injury
- Increased cytokine production causing systemic inflammatory reaction and potentially SIRS → alterations in metabolism
  - Catabolism of glycogen, protein and fats → Diverted from normal nutritive purposes to aid in healing and immune response
- Catabolism of protein at lean body mass expense (muscle protein)
  - Main target of pre and post-op nutrition therapy!
- Insulin resistance

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Main points

- Given surgical risks of malnutrition, stress of surgery, as well as benefits of nutrition support
- SCREENING FOR MALNUTRITION IS ESSENTIAL!!
- NUTRITION OPTIMIZATION IS ESSENTIAL!!

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Malnutrition Definition/Dx

- Simple def → Any nutrition imbalance
- Standardized from ASPEN and AND → any 2 of the following 6 criteria
  - 1) Insufficient energy intake
  - 2) Weight loss
  - 3) Loss of muscle mass
  - 4) Loss of Sub Q Fat
  - 5) Localized or generalized fluid accumulation (edema)
  - 6) Diminished functional status (as tested by hand grip strength)

- Need a thorough history and physical exam!

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Brief Diet Screening

- In a brief screen, to establish inadequate energy intake →
  - Have you had a reduced appetite?
  - Have you been eating at least 75% or even 50% less than your usual intake
  - Either positive answer will establish insufficient energy intake
  - Subsequently – how long have you had a reduced appetite? – help establish mild-moderate or severe malnourishment

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Nutrition Focused PE

- Anthropometric data – Ht, Wt, BMI
  - Specifically looking historically for wt loss (>10% establishes 2nd component to malnutrition)

- CNs – May give cues to swallowing difficulties if palsies present
- Oral cavity – poor dentition, oral ulcers will affect food consumption
- MSS – look for typical areas of muscle, and fat wasting, reduced muscle strength – particularly grip
- PV – Edema

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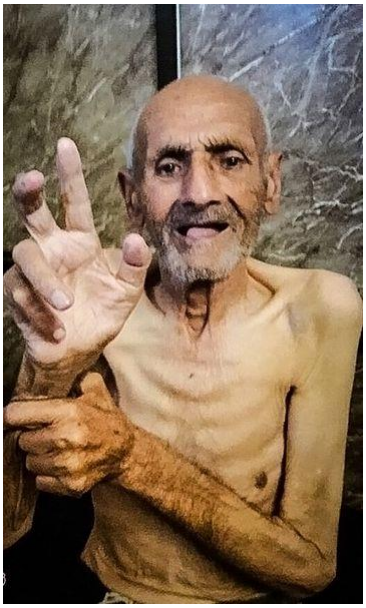

Pitting at temples – wasting of temporalis muscle

Pitting around clavacles

Boney humeral head – loss of deltoid mass

Loss of intercostal adipose tissue and intercostal muscle

On posterior thorax → wasting of lats & trapezious leads to scapular widening

Lost of muscle mass of the calfs

ALSO SEE: orbital fat loss, loss of adipose at posterior triceps

Edema – third spacing secondary to reduce intravascular protein

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Nutrition Focused PE

- Hand grip strength – use dynamometer
  - Reduced grip strength compared to normative data supplied by manufacturer depending on device utilized

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Alternative evaluation

- Modified malnutrition screening tool proposed by American Society for Enhanced Recovery (ASER) and Perioperative Quality Initiative workgroup
- Pre-op Nutrition Score (PONS)
  - BMI < 18.5 or <20 if 65 or older
  - 10% or greater unintentional wt loss in the past 6 months
  - Serum Albumin < 3.0

- Yes to any of the previous criteria → pre-op nutrition intervention, dietitian office referral

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Nutrition assessment - History

- 24-hour diet recall
  - Ask patient about all food and drink consumed in a 24-hour period
  - Can focus on the person's "typical day" or use yesterday
  - Questions to ask:
    - What was your first, second, third meal of the day? Did you have any snacks?
    - What did you specifically eat at each meal? What did you drink?
    - Estimate the portion size of each food and drink component of each meal – should be done as you ask
    - How does this day differ from any other day of the week?
- Perioperative focus should be placed on protein consumption
  - RDA for healthy adults – 0.8g/kg/d of protein
  - Those undergoing surgery – 1.2 – 2.0g/kg/d of protein

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Nutrition assessment – 24-hour recall series of questions, example

- What was your first meal of the day?
  - Breakfast
- What did you have for breakfast?
  - Eggs and toast
- How many eggs did you have, and how were they cooked?
  - 2 eggs scrambled
- How many pieces of toast? What type of toast?
  - 2 pieces of toast, whole wheat
- Did you put anything on your toast?
  - Yes, butter
- How much butter?
  - About 1 pad between two slices
- Did you have anything to drink?
  - Yes, black coffee
- These questions would be similar for each meal, and the interviewer would subsequently inquire about snacks and desserts

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24-hour recall – estimating protein consumption

- 1 oz of meat (chicken, beef, pork, fish, cheese) and 1 whole egg = 7grams of protein
- 1 cup of milk = 8 grams of protein
- Starches (bread, pasta, cereal, rice, oatmeal, beans, ect)
  - 1/3 – ½ cup of pasta, cereal, rice, oatmeal, beans = 3g of protein
  - 1 slice of bread = 3g of protein
- ½ cup of cooked Vegetables or 1 cup of raw vegetables = 2g of protein

- So for example, 3oz of meat = 21 grams of protein

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Estimating protein

- 1 deck of cards or palm of hand = 3 to 4 oz of meat
- 4 stacked dice = 1 oz of cheese
- 8oz of milk (1cup) = 8g

- So pt reports portions slightly bigger than a deck of cards - estimate about 4-5oz.

- EXAMPLE = If a 70kg patient eats 2 eggs in the morning, 3 oz of meat at lunch, and 5 oz at dinner = 70 grams of protein from animal sources per day
  - OR about 1g/kg/d

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Diagnostics

- Labs?
  - No specific labs that indicate malnutrition
  - Albumin and prealbumin – utilized, but not without pitfalls!
  - Other labs
    - CPR level
    - Vitamin D?
  - CT scan – evaluation of lean body mass
    - May assist in nutritional risk evaluation

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Management

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Nutritional management

- Can be broken up into categories of patients
  - Well-nourished
  - Malnourished (exists on a spectrum)

- Preoperative care
- Post-op

- EVERYONE GETS A NUTRITION EVALUATION!

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Well-Nourished Patients – Pre-op

- Encourage high quality protein diet consumption
  - Aim for 1.2 – 2.0- grams of protein per kilogram body weight
  - Eggs, poultry, beef, fish, pork, milk, soy (particularly if vegetarian)
  - Starting at least 7-days prior to surgery
  - Consider/encourage oral nutrition supplements

- Adequate calorie consumption for surgery – needs typically 25 calories/kg/d
- Night prior and the morning of surgery up to 2 hours before – oral clear liquid carbohydrate solutions
  - 50g of carbohydrate 2 hours prior to surgery, and 100g the night before

- Consider participation in resistance training as part of a prehab program

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Well-nourished patient – POST-OP

- Resume oral feedings with clear liquids within HOURS after feeding - ESPN
  - Avoidance of typical withholding of feeding
- Resume oral feedings with high protein diet on day of surgery – ASER
  - Make sure to also include adequate carbohydrates
- Continue high protein diet 4-8 weeks post surgery
- Exceptions:
  - Bowel not in continuity, bowel ischemia, persistent bowel obstruction

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Nutritional Management – Malnourished patients Pre-op

- Similar to well-nourished but more aggressive!

- High protein diet 1.2 – 2.0g/kg/d
  - Begin 14 days prior to surgery
  - Encourage highly bioavailable protein sources
  - Start oral nutrition supplements – 18g of protein per serving or greater
  - Consider immunonutrition therapy

- Minimize perioperative fasting
  - Carbohydrate feedings 2 hours prior to surgical procedure, and the night prior
  - Feed either within hours of surgery with clears OR within the same day of surgical procedure with high protein diet

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Malnourished patient – Pre-op

- If patient is unable to meet nutritional needs orally → Dietitian referral
  - Enteral nutrition (EN) should be order prior to surgery to meet needs for 10 days
  - Parenteral nutrition (PN) should be reserved for those who are unable to meet their nutrition needs orally, with EN or a combination
  - PN given for 7-14 days prior to surgery
  - If must use PN, should attempt to combine with EN or oral feedings
  - If severely malnourished and receiving PN, must monitor for signs of refeeding syndrome
  - Resistance training program if possible

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Malnourished patient – Post-op

- Similar for well-nourished patient
  - Resume high protein diet on same day of surgery – ASER
  - Clears within the first HOURS after surgery
  - Continue high protein diet for 3 – 6 months post surgery!

- Enteral nutrition/PN considerations
  - Patients anticipated to be unable to meet 50% of their needs orally, will benefit from EN within 24 hours of surgery (ASER) → reduces morbidity and mortality
  - Continue EN ideally for 4 weeks post surgery
  - PN to be utilized concurrently with EN if possible
  - If the patient does not tolerate EN, PN to be utilized within 4 days of surgery (ASER)
  - PN should be utilized within 4 days if acceptable access is already in place after surgery (ESPEN)

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Oral supplement options

- High protein supplements – wide variety
  - Excellent bioavailability of milk proteins – whey and casein → may recommend preoperatively
  - Others: Boost, Ensure, Glucerna
- Immunonutrition supplements – combination product
  - Arginine
  - Omega-3-fatty acids
  - Antioxidants
  - Generally given 5 days prior to surgery and up to 7 days after
  - Studies have demonstrated reduced surgical complications and length of stay
  - Particularly beneficial for wound healing

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Macronutrient benefits in well-nourished and malnourished patients

- Protein – improve, promote building of lean body mass
  - Maximize protein stores prior to acute phase of injury following surgery
  - Reduced morbidity and mortality

- Carbohydrates - promote maximal glycogen storage
  - Improves insulin resistance following surgery
  - Improves psychological well-being after surgery
  - Evidence demonstrating improved post-op nausea and vomiting
  - Evidence demonstrating reduced length of hospital stay
  - Avoid use in poorly controlled diabetics

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Nutrient timing

- Concepts from sports nutrition
- 1.2 – 2.0 g/kg/d of protein – same range we feed collegiate and professional athletes throughout the spectrum of their season
- Carb loading – 50 and 100g glucose load the night and morning of surgery
  - Similar concept as promotion of optimal glycogen concentrations prior to endurance events
- Optimal protein timing? → Muscle protein synthesis best maximized by 25-35g protein load at meals
  - Similar to recover recommend s/p resistance and endurance training workout
  - May stimulate protein synthesis best pre-op and post-operatively if protein spread throughout the day

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Post-op trouble shooting

- Ileus
  - Evidence shown this can be minimized by meticulous fluid management perioperatively
    - Excessive positive fluid balance increases likelihood of prolonged ileus
  - Minimize also by: utilizing as minimally invasive a procedure as possible, reducing opioid utilization by employing epidural anesthesia
- Poor oral tolerance
  - Nutrition consultation – consideration for early EN, PN, add on oral protein supplements
  - Poor tolerance for EN feedings – gastric residuals of > 500 ml → consider early PN w/ in 4 days
- Insulin resistance/hyperglycemia
  - Pre-op oral glucose consumption

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Post-op trouble shooting

- Wound infections, and poor wound healing
  - Minimized by oral protein supplements pre and post as well as immunonutrition therapy
- Anastomotic leak
  - Immunonutrition therapy

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