

## THE ROLE OF NUTRITIONAL STATUS IN THE POST - OPERATIVE OUTCOME OF SURGICAL PATIENT

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**SUMMARY** A simple anthropometric parameter of body mass index (BMI) and haematological index of haemoglobin concentration were used to assess the nutritional status of 64 patients pre-operatively. These patients were scheduled for intermediate surgery, (in term of invasiveness) at the University of Calabar Teaching Hospital. The patients peri-operative course and outcome were noted. Pre-operatively, 19(29.7%) were malnourished having a BMI of  $< 20\text{kg.m}^{-2}$ . These patients also had the least haemoglobin concentration of  $10.13 \pm 1.5\text{g.dl}^{-1}$ . Six (30%) of the patients in this group with haemoglobin  $< 10\text{g.dl}^{-1}$  developed surgical wound infection, with a mean length of hospital stay of  $19.9 \pm 6.66$  days. At discharge 24 (37.60%) were malnourished having a BMI of  $< 20\text{kg.m}^{-2}$ . Although no mortality was recorded, it should be noted that malnutrition is potentially dangerous in surgical patients. Adequate attention should therefore be given to the nutritional status of surgical patients in the peri-operative period.

**Key Words:** *Body Mass Index, Intermediate Surgery, Outcome.*

### Introduction

The relationship between surgical outcome and nutritional status was first highlighted by Studley (1936), who reported increased mortality in patients classified as malnourished. Butterworth (1974), in another report suggested that nutritional problems could often be iatrogenic, due to the inadvertent failure of some physicians to take into account the nutritional needs of the patient in the practice of medical care and surgery. Aoun et al. (1993) in a hospital survey on protein-calorie malnutrition, observed that up to 53% of surgical patients had evidence of malnutrition.

The University of Calabar Teaching Hospital does not have a central feeding policy. In-patients are allowed to feed, unsupervised, on home made food which are often lacking in most nutrients. In the early post-operative period, some patients are sustained on crystalloid infusion alone for the first 24 - 48 hours

The aim of this study was to use a simple anthropometric parameter of body mass index (BMI) and the haematological index of haemoglobin concentration as indices of the nutritional status of the patients coming for intermediate surgery and relate such to the peri-operative outcome and length of hospital stay. The finding, it is hoped, may improve the care of surgical patients in the peri-operative period.

### Patients and Methods:

Following approval by the local ethical committee, an informed consent was obtained from each patient. The patients' physical state was assessed and categorized using the American Society of Anaesthesiologist's (ASA) classification:

Class I: A normal healthy patient

Class II: A patient with mild systemic disease

Class III: A patient with severe systemic disease that limits activity but is not incapacitating.

CLASS IV: A patient with an incapacitating systemic disease that is a constant threat to life.

CLASS V: A moribund patient not expected to survive with or without operation.

Adult patients of physical status ASA I to III, scheduled for intermediate surgery were studied. Patients with malignancy and those on steroid therapy were not included in the study.

The weight and height of each patient were measured and the body mass index ( $\text{kg.m}^{-2}$ ) calculated. Haemoglobin concentration was used as an index of the nutritional status of the patients pre-operatively. Each patient had all basic investigations carried out.

Sixty-two of the patients had general anaesthesia while only two had local infiltration with lignocaine for herniorrhaphy.

The peri-operative course, outcome and length of hospital stay were all noted.

At discharge, the patients were re-assessed and the findings were noted. The data so obtained were evaluated using simple proportion, rates and tables.

#### Result:

1. Group A (BMI < 20kg.m-2)
2. Group B (BMI = 20-25kg.m-2)
3. Group C (BMI = 25 - 30kg.m-2)
4. Group D (BMI > 40kg.m-2)

- Malnourished
- Normal nutritional state
- Over weight
- Morbid obesity

Pre-operatively, the majority of the patients 34 (53.13%) were in normal nutritional state (BMI = 20-25kg.m-2). Nineteen (29.7%) patients were malnourished (BMI < 20kg.m-2). Ten (15.6%) patients were overweight (BMI = 25 - 30.m-2). One (1.6%) patient was morbidly obese (BMI > 40kg.m-2).

Majority of the patients 34 (53.1%) were in ASA I. There were 29 (45.3%) patients in the ASA II and one (1.6%) in ASA III class.

The malnourished patients with the least BMI had the least haemoglobin concentration of 10.13  $\pm$  1.5g.dl-1 (Table II), while the highest haemoglobin concentration of 14.6g.dl-1 was seen in the morbidly obese patient.

Post-operatively six (32.0%) patients of the malnourished group developed wound infection,

During the period of this study, 64 patients were evaluated. These were made up of 43 males and 21 females giving a male to female ratio of 2.1:1. The mean age was 37 years (18 - 60). The operations performed mostly were herniorrhaphy 28 (43.8%) and appendicectomy 26 (40.6%) (Table I), and as shown on table I, the patients were categorized into four nutritional groups:

with a mean length of hospital stay of 19.9  $\pm$  6.66 days. Other patients, had a mean length of hospital stay of 9.80  $\pm$  2.46 days. None of the patients were, however, re-exposed to anaesthesia or surgery.

Post-operatively at discharge, as shown in table III, although patients with normal nutritional status (Group B) were in the majority, the number had reduced to 30 (46.9%). The malnourished patients (Group A) had increased to 24 (37.5%). The number of the overweight patients (Group C) had also reduced to nine (14.1%). The morbidly obese patient (Group D), though he lost 1.75% of his body weight, still had a BMI greater than 40kg.m-2. No mortality was recorded in this survey.

TABLE I: TYPE OF SURGERY, SEX DISTRIBUTION AND BODY MASS INDEX (BMI) (PRE-OPERATIVE)

S/no.	Type of Surgery	Sex		BMI (kg.m-2)				Total (%)
				A <20 (n=19)	B 20 - 25 (n = 23)	C 25-30 (n=10)	D >40 (n=1)	
1	Herniorrhaphy			23	5	10	10	8 (43.75)
2	Appendicectomy	14		12	4	20	1	1 (40.6)
3	Haemorrhoidectomy			4	4	5	2	1- (12.5)
4	Hydrocoelelectomy	2		-	-	2	-	2 (3.1)

TABLE II: BMI, HAEMOGLOBIN AND ASA CLASS

S/no	BMI (kg.m <sup>-2</sup> )	Mean Haemoglobin (gdl <sup>-1</sup> )	ASA Class	Total n (%)
1.	< 20	10.13 ± 1.5	II	19 (29.7)
2.	20 - 25	14.2 ± 1.3	I	34 (53.1)
3.	25 - 30	13.5 ± 1.0	II	10 (15.6)
4.	> 40	14.6	III	1 (1.6)

TABLE III: TYPE OF SURGERY, SEX DISTRIBUTION AND BODY MASS INDEX (BMI) (POST-OPERATIVE)

S/no.	Type of Surgery	Sex M	F	BMI (kg.m-2)				Total (%) (n=64)
				A <20 (n=24)	B 20 - 25 (n = 30)	C 25-30 (n=9)	D >40 (n=1)	
1.	Herniorrhaphy		23	5	11	10	7	28 (43.75)
2.	Appendicetomy		14	12	8	16	1	26 (40.6)
3.	Haemorrhoidectomy		4	4	5	2	1	8 (12.5)
4.	Hydrocelectomy		2	-	-	2	-	2 (3.1)

**Discussion:**

Earlier studies by Larson et al (1994) had stated that the prevalence of unrecognized malnutrition is high in surgical patients<sup>4</sup>. It is therefore important to assess surgical patients pre-operatively to determine their baseline nutritional status, in order to prevent unwarranted morbidity or even mortality.

The anthropometric measurement of body mass index (BMI) and haematological index of haemoglobin concentration were used as indices for the patients' nutritional status in this study. There is a controversy with regard to the best method of assessing nutritional status. Forse and Shigal (1980) evaluated the reliability of nutritional assessment by comparing the various parameters with simultaneous body composition. This correlation was poor, and tended to show body mass index (BMI) as the best. Of the 64 patients studied, 19 (29.7%) of them were malnourished having a BMI of < 20kg.m-2. This is however, below the 53% of the malnourished surgical patients as reported by Aoun J. P. et al (1993). This may be due to the fact that our survey was made up of only patients for intermediate surgery, which tended to limit our study population.

Pre-operatively, out of the 19 malnourished patients, 12 were males. Post-operatively, again, out of the 24 malnourished patients, 15 were males. From this study, it may appear that male surgical patients are probably more vulnerable to protein - calorie malnutrition.

Adequate measures should therefore be taken to provide this group of patients with nutrients in the peri-operative period. The 19 (29.69%) patients with BMI less than 20kg.m-2 had a mean haemoglobin concentration of 10.13 ± 1.5g.dl-1. This is in agreement with the report by Forse and Shizgal<sup>5</sup> that BMI correlates well with haematological index such as haemoglobin concentration. In this study, wound infection was seen in the group of patients with haemoglobin < 10g.dl-1. Haemoglobin concentration of 10g.dl-1 is probably the minimum level a patient must attain to prevent wound infection. This is the optimal level for oxygen availability to the tissues.

Wound healing can be affected by many factors such as anti-coagulants, antineoplastic therapy and high dose steroid therapy besides malnutrition. In this survey the six (30%) patients who developed wound infection were not on any of the aforementioned drugs. Telfer and Moy (1993) had earlier noted that malnutrition is one of the factors that delay wound healing. With prolonged hospital stay, there was deterioration of BMI in all the groups of patients, a fact earlier noted by Wyszynski (1998).

Surgical trauma and anaesthesia lead to metabolic expenditure which may explain the increase in the number of patients with BMI less than 20kgm-2 post-operatively. Elebute (1969), in his study, noted an increase in nitrogen excretion following surgery in Nigerians and

attributed this increase to high environmental temperature. This fact, however, was beyond the scope of this study hence cannot be confirmed.

Law et al (1973) had reported that malnutrition and compromised immunostatus predispose patients to infection, and ultimately complicate surgical outcome. Malnutrition also delays convalescence and recovery in surgical patients and these facts were evident in this study. The six patients who developed wound infection probably did so on account of malnutrition coupled with impaired immunocompetence.

Rolandelli and Ullrich (1994) reported that malnutrition is known to increase mortality rate. In this study although no mortality was recorded, it should be noted that malnutrition is potentially dangerous in surgical patients.

We therefore conclude that a peri-operative nutritional assessment, using a simple anthropometric parameter of body mass index (BMI) and haematological index of haemoglobin concentration should be a requirement for all patients undergoing surgery. Adequate nutritional intake, either enterally or parenterally in the pre and post-operative period is recommended to hasten convalescence and recovery. This will prevent impairment of immunocompetence and therefore shorten hospital stay.

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#### References

- Aoun J. P., Baroudi J., Geahchan, N. (1993), Prevalence of
- Butterworth C. E. (1974) Jr. The skeleton in the hospital closet. *Nutrition Today*:8:4
- Elebute E. A. (1969), Evaporative fluid loss in Adult Nigerian Males. *British Journal of Surgery*; 52; 213 - 216.
- Forse R. A., Shizgal H. M. (1980), The assessment of malnutrition. *Survey*: 88:17-24.
- Larson J. Akerlind I., Parmertth J. and Hornqvist J.C. (1994), The relation between nutritional state and quality of life in surgical patients. *Eur. J. Surg*: 160 (6-7); 329-334.
- Law D. F., Dudrick S. J., Abdon N. I. (1973), Immunocompetence of patients with protein-calorie malnutrition. *Ann Intern Med*: 79;545-550.
- Malnutrition in general Surgical patients J. Med. Liban; 4 (2):
- Rolandelli, R. H., Ullrich J. R. (1994) Nutritional support in the frail elderly *Surgical Patient. Surg. Clin North Am.*, 74 (1): 79-92.
- Studdley H. C. (1936), percent weight loss: a basic indicator of surgical risk. *JAMA*, 106; 458 - 460.
- Telfer N. R; Moy R. L. (1993) Drug and nutrient aspects of wound healing. *Dermatol Clin*: 11 (4); 729 - 733.
- Wyszynski D. F., Crivellu A. Ezquerro S. and Rodriquez A. (1998), Assessment of nutritional status in a population of recently hospitalized patients. *Medicina (B. Aires)*: 58 (1): 51 - 57.

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