



Comparison of Infection Rates Among Critically Ill Patients Per Their Route of Nutrition: A Retrospective Analysis

Kritik Hastalarda Nütrisyon Yoluna Göre Enfeksiyon Oranlarının Karşılaştırılması: Retrospektif Analiz

Nütrisyon Yoluna Göre Enfeksiyon Oranları / Infection Rates Per Route of Nutrition

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Özet

Amaç: Beslenme desteğinin bir komplikasyonu olan enfeksiyon yoğun bakım ünitelerinde (YBÜ) önemli bir sorundur. Hastanemiz yoğun bakımda, parenteral nutrisyon (PN) ve enteral + parenteral nutrisyon (EN + PN) kombinasyonu uygulanan hastalardaki enfeksiyon oranlarındaki farklılıkları retrospektif olarak belirlemeyi amaçladık. **Gereç ve Yöntem:** Bu çalışmaya, 1 Ocak 2011 ile 1 Ağustos 2011 tarihleri arasındaki 156 hasta dahil edildi. Parenteral beslenme grubunda 88 hasta (Grup 1) ve enteral + parenteral beslenme grubunda 68 hasta (Grup 2) vardı. 156 hasta üzerinde retrospektif değerlendirme yapıldı ve iki haftalık kültür sonuçları kaydedildi. Esas amaç bu iki grup arasında herhangi bir enfeksiyon değişkenliği göstermekti. Özellikle, yumuşak doku enfeksiyonları, deri enfeksiyonları, kateterle ilişkili kan dolaşımı enfeksiyonu, pnömoni ve idrar yolu enfeksiyonları kaydedildi. HI (hastane enfeksiyonu) sıklığı ve görülme sıklığı yoğunlukları da her iki grupta hesaplandı. **Bulgular:** Grup 1 de 16 hastada da kayıtlı enfeksiyon tesbit edildi. Bunlar; 4 hastada kateter ilişkili kan dolaşımı enfeksiyonu ve pnömoni, 3 hastada idrar yolu enfeksiyonları ve 5 hastada yumuşak doku enfeksiyonu şeklindeydi. Grup 2 de, 8 hastada enfeksiyon bulguları mevcuttu. Bunlar, 4 olguda kateter ilişkili kan dolaşımı enfeksiyonu, 2 vakada yumuşak doku enfeksiyonu ve 3 hastada idrar yolu enfeksiyonu idi. Grup 2'de bildirilen hiçbir pnömoni olgu yoktu. **Tartışma:** Çalışmamızın sonuçlarına göre, kateterle ilişkili kan dolaşımı enfeksiyonu hariç, enteral ve parenteral beslenme grubun tüm enfeksiyon sayıları parenteral beslenme gruba göre azalmıştır fakat sonuç istatistiksel olarak anlamlı değildir. Enteral beslemeye intolerans enfeksiyon oranlarının artışının bir sonucu olarak hastanede kalış süresi ile maliyeti arttırabilmektedir. Enfeksiyon oranlarını azaltabileceğini düşündüğümüz benzer beslenme kombinasyon rejimlerinin kullanılması taraftarız.

Anahtar Kelimeler

Beslenme; Enteral; Parenteral; Enfeksiyon

Abstract

Aim: Infection is an important problem in intensive care units (ICU) which is a complication of nutritional support. In our institution, we aimed to determine the differences in infection rates of patients who were supported with parenteral nutrition (PN) and enteral + parenteral nutrition (EN+PN) combination retrospectively. **Material and Method:** In this study, we enrolled 156 patients from January 1, 2011 to August 1, 2011. There were 88 patients in the parenteral nutrition group (Group 1) and 68 patients in the enteral+parenteral nutrition group (Group 2). On all 156 patients, retrospective chart reviews were performed and biweekly culture results were recorded. Specifically, soft tissue infections, skin infections, catheter related blood stream infections, pneumonia and urinary tract infections were recorded. HI (hospital infection) incidences and incidence densities were also calculated in both groups. **Results:** There were 16 recorded infections in 16 patients among Group 1. These were 4 cases of catheter related blood stream infections, 4 cases of pneumonia, 3 cases of urinary tract infections and 5 cases of soft tissue infections. In group 2, 8 patients showed signs of infection. These were, 4 cases catheter related blood stream infections, 2 cases of soft tissue infections and 2 cases of urinary tract infections. There were no reported pneumonia cases in group 2. **Discussion:** According to our results, with the exception of catheter related blood stream infections, infection numbers declined within the group of combination of enteral and parenteral nutrition group than parenteral nutrition group alone, but the results were not statistically significant. The intolerance to enteral nutrition can increase the cost of stay, mainly due to increased length of stay as a result of increased infection rates. We would recommend a combination nutrition regimen in such a similar situation, in order to decrease infection rates.

Keywords

Nutrition; Enteral; Parenteral; Infection

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Introduction

Nutritional support is part of the standart of care for the critically ill adult patient [1]. Enteral nutrition (EN) is the frequently used method of providing nutrition support but it is often interrupted in critically ill patients due to various reasons. When EN fails, practitioners often prescribe parenteral nutrition (PN) alone or in combination with EN to achieve the estimated nutrient needs. In the average patient in the intensive care unit who has no contraindications to enteral nutrition (EN) or parenteral nutrition(PN), the choice of route for nutritional support may be influenced by several factors [1].

Infection is a serious complication of nutritional support causing a high rate of mortality and morbidity [2]. The relationship between the type of nutritional support and the risk of infection development is still unclear and needs further investigation [2,3]. Because there is no clinical study about comparison of infection rates of patients supported with PN and EN+PN combination, we aimed to search infection rates of these two groups retrospectively.

Material and Method

During the period from January 1, 2011 to Agust 2, 2011 a total of 156 patients on nutritional support followed up in an ICU were analyzed, retrospectively. The primary diagnoses of patients were heterogenous. Patients who had an infection during admission to the hospital and who had previously antibiotic usage were excluded. Intolerance of enteral nutrition (EN) was defined as aspirated gastric residual volume (GRV) > 250 ml over 3 consecutive days. On admission EN was the first choice for nutrition support but because of intolerance, 88 patients received total parenteral nutrition. There were 88 patients-37 females and 51 males- with mean age 67.3 in the parenteral nutrition group from January 1 2011 to 1 April 2011 (Group 1) and 68 patients-30 females and 38 males- with mean age 69.8 in the enteral + parenteral nutrition group from 2 April 2011 to 2 Agust 2011 (Group 2). Although the routes of administration of the diets were different, the patients of both groups had a similar caloric intake. All the patients in the 2 groups reached the maximum value of total caloric intake obtained by Harris-Benedict equation. Retrospective chart reviews were performed for all patients included study and biweekly culture results were recorded. Soft tissue infections, skin infections, catheter related blood stream infections, pneumonia and urinary tract infections were recorded. HI (hospital infection) incidences and incidence densities were also calculated according to the formulation below, in both groups. 88 patients in Group 1 were given parenteral nutrition via subclavian catheters and in Group 2 subclavian catheters and nasogastric route was used.

HI rate (%): (infection number/patient number) x 100

Incidence density: (infection number / patient day) x 1000

Results

Sixteen and 8 of the 156 patients had different infections in Group 1 and Group 2 respectively. 132 of the patients (84.6 %) were free of infection. 72 patients (81%) in group 1 and 60 patients (88%) in group 2 were free of infection.

In group 1 there were 16 recorded infections in 16 patients. These were 4 cases of catheter related blood stream infections,

4 cases of pneumonia, 3 cases of urinary tract infections and 5 cases of soft tissue infections. In group 2, 8 patients showed signs of infection. These were, 4 cases catheter related blood stream infections, 2 cases of soft tissue infections and 2 cases of urinary tract infections. There were no reported pneumonia cases in group 2.HI rates and incidence densities were seen in table 1.The primary diagnoses of 156 patients are summarized in Table 2. The APACHE score of patients in Group 1 and 2 who were free of infection during admission to hospital were 19.1 and 18.3, respectively and the difference was not statistically significant (p<0.05).

Table 1. HI rates and incidence densities of groups

	Group 1		Group 2	
	HI incidence	Incidence densities	HI incidence	Incidence densities
Nosocomial infections				
Soft tissue ,skin infection	5,68	9,29	2,94	4,24
Catheter related blood stream infection	4,55	7,43	5,88	8,47
Pneumonia	4,55	7,43	0,00	0,00
Urinary tract infection	3,41	5,58	2,94	4,24
TOTAL	18,18	29,74	11,76	16,95

Table 2. Distribution of primary diagnosis of patients and their nutritional support

Primary diagnosis	Parenteral nutrition (n=88)	Enteral+Parenteral nutrition (n=66)
Pulmonary diseases	27	19
Neurologic diseases	18	12
Trauma	14	9
Oncologic diseases	7	11
Orthopedic diseases	13	8
Neurosurgical diseases	9	7

All the patients in the 2 groups reached the maximum value of total caloric intake (obtained by Harris-Benedict equation) Chi squared test of independence was used for statistical analysis and the results as;

Soft tissue infection

Group 1: 5 patients (%5,6)

Group 2: 2 patients (%2,9)

p=0.470

Blood stream infections

Group 1: 4 patients (%4,5)

Group 2: 4 patients (%5.8)

p=0.729

Pneumonia

Group 1: 4 patients (%4,5)

Group 2: 0

p=0.133

Urinary tract infections

Group 1: 3 (%3,4)

Group 2: 2 (%2,9)

p=1.00

All infections

Group 1: 16 (%18,2)

Group 2: 8 (%11,7)

p=0.271

The results were not statistically significant between both groups.

Discussion

There are many studies comparing infections of EN+PN combination with EN alone but there is no report of the comparison of EN+PN combination and PN in critically ill patients. Recent reviews have documented evidence that nutritional support influences morbidity and mortality rates in critically ill patients [1,3]. Among ICUs there is great variation ranging from 4 % of patients on combination EN+PN to as high as 60-80 % of patients, as seen in some European centers [4-6]. In Clinical Practice Guidelines for Nutrition Support, the use of EN over PN is strongly recommended in patients with an intact gastrointestinal tract [7]. PN represents an important alternative or supplement to EN when there is a deficiency in meeting the nutritional requirements in critically ill patients via the enteral route as a result of inability to use the gastrointestinal tract or intolerance of enteral nutrients [8]. Hill and Garvin reported, from 12% to 71% of critically ill patients receiving PN as nutritional support [9,10]. In our retrospective study due to intolerance of enteral nutrition we have to support 88 patients with parenteral nutrition during 6 months period.

Although the routes of administration of the diet were different, the patients of both groups had a similar total caloric intake. In Chiarelli's report a higher incidence of bronchopneumonia was observed in the group receiving EN+PN vs. EN alone (6/12, 50% vs. 3/12, 25%. p=0.085) [11]. There were no differences in infectious complications between the groups in a larger study of Bauer in a similar population of ICU patients [12]. Leah reported that nine of the 13 studies reported data on infectious complications with EN versus PN and the nature of the infectious complications varied with the particular patient population and included pneumonia, aspiration pneumonia, urinary tract infections, bacteriemia wound infection, abdominal abscess, and line sepsis, when the data aggregated from these studies, there was a significant decrease in the number of patients with infectious complications who had received EN rather than PN [1]. In our study except catheter related blood stream infection, hospital infection incidence and incidence densities decreased in soft tissue skin infections, catheter related blood stream infections, pneumonia and urinary tract infections but the results were not statistically significant.

A cohort study among patients with central venous catheters, with or without PN, found that PN was an independent risk factor for BSI [11]. Many studies since the 1970's associate the use of PN with the development of BSI [13,14]. Casaer et al found that critical care patients who received early PN in combination with EN experienced a 7.5% rate for BSI, compared to the 6.1 % rate of the EN-only group (p < .05) [15].

Marik's nonrandomized studies shows the addition of trickle feeds i.e., small amounts of enteral nutrition added to parenteral nutrition reduces the complications associated with par-

enteral nutrition in ICU patients [16,17].

Conclusion

The use of EN+PN versus PN in the critically ill patients and may be less costly and less infection may be seen but the comparison of infections between two groups were not statistically significant. If possible EN+PN may be the better route of nutritional support.

Competing interests

The authors declare that they have no competing interests.

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