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Original Article

Effects of Early Enteral and Parenteral Nutrition on Anastomosis Healing in Dogs Undergoing Jejunal Anastomosis

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Abstract *- Malnutrition is a common problem in surgical patients, occurring in approximately 50%. While good nutritional status accelerates wound healing, severe malnutrition contributes negatively to wound healing. This study aimed to investigate the effects of early enteral nutrition (EEN) and parenteral nutrition on anastomosis healing in cases with jejunal anastomosis. 12 dogs were operated on after 10 days of quarantine. Approximately 1 cm of the jejunum segment was resected, and anastomosis was performed. All subjects in the postoperative enteral and parenteral groups were given 50% of the calorie requirement on the first day and 75% of the calorie requirement on the second day. On the 7th postoperative day, the subjects were operated again, and the jejunum, including the anastomosis site, was resected with an average of 10-12 cm. Then, this anastomotic ring was created as a closed circuit and bursting pressures were calculated. Anastomotic burst pressures and biochemical parameters of the subjects were analyzed using Mann-Whitney U and correlation tests. Although anastomotic burst pressures were higher in the EEN group than in the parenteral nutrition group, the difference was insignificant in statistical analysis (p = 0.3173). In the study, it could not be shown that the anastomotic healing of the subjects who received EEN was superior to the early parenteral nutrition group.*

Keywords *- Surgical anastomosis, Jejunum, Enteral nutrition, Parenteral nutrition.*

1. Introduction

Patients who undergo intestinal anastomosis in the gastrointestinal system constitute an important group that every surgeon encounters, follows and treats in their daily routine. It is the routine clinical practice of many surgeons to not give oral food for 2-3 days after resection and anastomosis to accelerate anastomosis safety and healing.

Studies conducted on piglets have shown that parenteral nutrition can fulfill all human energy needs, and mortality and morbidity have decreased with its application in clinics. However, ongoing clinical and experimental studies have revealed that administering nutrients via the gastrointestinal (GI) route has significant advantages in terms of both physiological and host defense [1]. Three major physiological advantages of enteral nutrition compared to parenteral nutrition were observed. Protecting the function of the intestine, preventing or correcting villus atrophy, stopping the translocation of bacteria from the atrophic intestinal mucosa to the lymph system and circulation, and strengthening the person's immune system [2]. Early Enteral Nutrition (EEN), initiated within the first 36 hours after injury and major surgery, appears contrary to routine practice in patients undergoing GI anastomosis. Because of the concerns that both the nutritional product and the increase in GI secretions such as bile, stomach, and pancreas that it stimulates may cause anastomotic leakage, delay the healing of the anastomosis, and ultimately increase mortality and morbidity rates, it is met with resistance. It is known that EEN reduces the excessive response to trauma and nourishes the organism and the intestine simultaneously. The rate of malnutrition in the hospital population and, especially in gastrointestinal surgery candidates, is between 30-60% [3]. Malnutrition paves the way for many complications, such as infection and wound healing defects. With EEN, this defect is tried to be eliminated as early as possible. With EEN, the translocation of the intestines prevents the organism from becoming an endogenous septic focus. The advantages of early enteral nutrition, shown by various studies after trauma and major surgery, are fewer septic complications after trauma, less multiple organ failure syndrome, less stress ulcer development, shorter time spent in intensive care,

generally shorter hospitalization time, better biochemical parameters and glutamine can be given early [2,4,5,6]. More studies have been conducted on suturing techniques and materials rather than the healing process in gastrointestinal surgery. These studies have increased our knowledge about GI healing and provided us with a better understanding of the effects of local and systemic factors on anastomotic healing. Since it is difficult to examine GIS healing mechanisms in clinical models other than retrospective analyses, most of our knowledge is based on animal models [7]. While blood flow and oxygenation of the anastomosis, mechanical bowel preparation, resting the intestines, non-steroidal anti-inflammatory drugs, transforming growth factor-beta, growth hormone make positive contributions to the anastomosis, radiotherapy, sepsis, diabetes mellitus, and blood transfusion negatively affect it.

Surgical technique is of great importance in the successful outcome of any surgery. After the anastomosis is completed, the lumen's adequacy, the ends' viability, and the presence of tension, torsion and distal obstruction should be investigated. Inverted or everted anastomosis techniques have different advantages and disadvantages [8,9].

Although there are many studies on the effects of early enteral nutrition on colon anastomosis healing in experimental studies, there are very few studies on the effects of early enteral nutrition on anastomosis healing in animal models with proximal small bowel anastomosis. Since almost all of the products used in enteral nutrition are absorbed in the jejunum and ileum, it is thought that the amount of product reaching the colon is very small and will not damage the anastomosis. However, there are very few studies in the literature on the answers to the question of how these products affect anastomotic healing in the small intestine, where absorption occurs to a large extent. This study aimed to investigate the effects of early enteral and parenteral nutrition on anastomosis healing in dogs undergoing jejunal anastomosis.

2. Materials and Methods

Following the approval of the SSK Göztepe Training Hospital Ethics Committee dated 13.10.1999, with the project approval of the Istanbul University Veterinary Faculty, Department of Surgery Board, the operations and postoperative follow-ups were carried out between October and December 1999 at the Istanbul University Faculty of Veterinary Medicine, Department of Surgical Sciences.

12 dogs were operated on following a minimum 10-day quarantine period. All subjects were given only milk and water a day before the operation. Oral intake was stopped on the day of surgery. One hour before the operation, the subjects were shaved, and prophylaxis was administered with 100 mg/kg piperacillin-tazobactom. Following Atropine and Diazepam premedication, anesthesia was induced with Etomidate and intubated, and they were operated on with Isoflurane inhalation anesthesia accompanied by a closed-system anesthesia device. The abdomen was entered through a midline incision. Following exploration, 5-10 cm of the intestine is removed from the end of the pancreas tissue. Distally, a 1 cm segment of the jejunum was resected, and a continuous suture was placed on the mesenteric surface with a 3/0 synthetic absorbable suture, leaving the first knot outside and covering all layers of the jejunum. When moving to the antimesenteric section, the anastomosis was completed with a single-layer suture technique that continuously included all layers of the jejunum from inside to outside.

For the subjects in the enteral group, feeding tube number 10 was placed into the duodenum via the nasoenteric route, and the operation was terminated. 5% Dextrose-Ringerlactate was given until nutritional support started. After 15-19 hours postoperatively, the daily calorie-fluid requirement was calculated as stated in Table 1, and all subjects in both the enteral and parenteral groups were given half of the caloric requirement on the first day of the application. On the 2nd day of the application, 75% of the calculated calories were given. On the 3rd and 4th days, the entire calculated amount was given. Nutritional support was given to the parenteral group through the enteral connection feeding pump from the vena cephalica antebrachi, in accordance with the body size of the subjects, from an intravenous set with an 18-22 G cannula. In the parenteral group, vascular access was changed every day to minimize the risk of thrombophlebitis. In the enteral group, the fluid requirement on the 1st day was provided with Ringer's lactate solution, and from the 1st postoperative day onwards, it was checked whether there was oral intake, and in those who did, a nasoduedonal tube was removed. Nutrition and fluid requirements were provided orally. 4 of the subjects included in the study in the enteral group started oral intake at the beginning of the second postoperative day. In 2 subjects who were extremely uncomfortable with the nasoduedonal tube and constantly tried to remove it, the entire administration was administered orally. Food was given orally to all subjects in the enteral and parenteral groups on the 5th and 6th postoperative days. Oral intake was stopped from the evening of the 6th day, and the subjects were taken into operation again on the 7th postoperative day. In the second operation, abdominal findings were documented; an average of 10-12 cm of jejunum, including the anastomosis area, was resected, and the operation was terminated.

Following the operation, an enteral pump feeding set was placed at one end of the jejunum segment removed after the operation, and a pressure transducer to measure invasive pressure on a portable monitor was placed and connected intraluminally to the other end, creating a closed circuit. Colored water was given with a feeding pump at a rate of 300 ml per hour. The highest pressure value reached was

read by monitoring the pressure values in the intestinal loop on the monitor. The burst pressure of the segments that did not burst at 270 mmHg pressure was evaluated as 270 mmHg.

An isotonic liquid standard solution was chosen as the feeding solution in the enteral group. For the parenteral group, parenteral nutrition solution was prepared using 10% Protein, 30% Dextrose, and 20% Lipid solutions with Automix Compounder so that the energy, protein, fat and carbohydrate ratios were suitable for the enteral nutrition solution (Table 1). The parameters of the subjects on the operation day, the 2nd, 5th postoperative day and the 7th day of the control surgeries were evaluated. Except for administering antibiotics to 2 subjects in the parenteral group who developed the clinical infection, no additional treatment was administered to any subject.

The tissue samples of the subjects were evaluated by a specialist pathologist according to their operation order and without specifying the group number. The subjects' calorie needs are (65): (30 x Bodyweight + 70) x 1.25 k.kal. Fluid needs were calculated based on daily calorie needs by multiplying by 1.2 for under 1 year of age and 1 for over 1 year of age. The day the solution was given, electrolyte and vitamin supplementation was made to the solution. Anastomosis burst pressures, and some biochemical parameters of the subjects were analyzed using the statistical program's Mann-Whitney U and correlation tests.

Table 1. Nutritional content of the solution given to the parenteral group

Macronutrients			
Protein	42 G	Protein 10%	433 ml
Carbohydrate	133,6 G	Dextrose 30%	267 ml
Lipid	34 G	Lipid 20%	170

3. Results

In control surgeries, it was observed that the anastomosis was surrounded by omentum in all subjects except the 4th subject in the parenteral group. Excessive serosal and omental adhesions were observed in the small intestines in the 5th subject in the parenteral group and the 2nd subject in the enteral group. The remarkable issue was that these subjects were operated on the same day, and their anastomotic burst pressure was low. No remarkable situation was observed in the operations of the other subjects. The characteristics of the subjects are given in Table 2.

Notably, there was an increase in the leukocyte count of the subjects in the parenteral group, especially on the 2nd and 5th postoperative days. This situation was caused by thrombophlebitis in subject no. 4 and thrombophlebitis and surgical site infection in subject no. 5. Antibiotherapy was administered Cefazolin in subject no. 4, and Cefazolin+Gentamicin combination in subject no. 5. In subject no. 6, signs of prerenal renal failure were observed, which started on the 2nd postoperative day and continued on the fifth day, although they decreased. When albumin values were examined, a significant decrease was observed on the second postoperative day in all subjects except subject no. 6. In subjects no. 1 and 2, following the fall on the 2nd day, a recovery was observed on the 5th day, and a fall was observed again on the 7th day. Initial albumin values in these subjects were within normal limits.

It was observed that the decrease continued in subjects 4 and 5, whose initial albumin values were below normal and at the lower limit. Transferrin values of these subjects were also parallel to the changes in albumin values. In subject no. 6, whose albumin levels did not decrease despite the development of prerenal failure, it was observed that the transferrin values partially decreased and did not show parallelism with the albumin values. Histopathological examination, together with burst pressure values, are present in Table 3.

In the parenteral group, the anastomosis healing of subjects 2, 3, 4 and 5 was interpreted as good, while subjects 1 and 6 were interpreted as poor. This interpretation does not show parallelism with the explosion pressure values, especially in subject no. 5. When the anastomotic burst pressures were examined, it was observed that the albumin and transferrin values were low in subjects 1, 4 and 5, and in subjects 6, who developed prerenal renal failure, but the lowest value was in subject 5, who developed surgical site infection along with thrombophlebitis. There is an increase in the leukocyte values of the subjects in the enteral group on the second postoperative day.

Albumin values significantly decrease on the second postoperative day, as in the parenteral group. Except for subject No. 2 and subject No. 4, who had high urea and creatinine levels, albumin values on the 5th and 7th postoperative days, unlike the parenteral group, decreased to the values on the day of the operation approached. In the histopathological examination, the anastomosis healing of subjects 1, 5 and 6 was interpreted as good, and that of subjects 2, 3 and 4 was interpreted as poor. Especially in subjects No. 3 and 4, anastomotic burst pressures and histopathological evaluation do not show parallelism. In light of the aforementioned findings, no statistically significant difference was detected when the groups were compared with the Mann-Whitney *U* test regarding burst pressures ($p = 0.3173$) (Table 4).

Table 2. Characteristics of the subjects

Operation No	Age	Gender	Social	Weight	Group and No
1	5-6 months	Female Q	hybrid, yellow-white	10.3 kg	Parenteral 1
2	8 months	Female Q	hybrid, white	11.2 kg	Parenteral 2
3	3 years old	Female Q	hybrid, light brown,	17.2 kg	Enteral 1
4	4 years old	Female Q	hybrid, white	21.6 kg	Parenteral 3
5	5-6 months	Male d'	hybrid,black-white	10.6 kg	Parenteral 4
6	5 years old	Male d'	hybrid, grizzly	20.1 kg	Enteral 2
7	5 years old	Female Q	hybrid, dark brown	21.2 kg	Parenteral 5
8	2 years old	Female Q	hybrid, brown-black	13.0kg	Enteral 3
9	4 years old	Female Q	hybrid, grey-white	18.1 kg	Enteral 4
10	5-6 months	Female Q	hybrid,coffee	9.5 kg	Enteral 5
11	4 years old	Female Q	hybrid,off-white-grey	22.0 kg	Parenteral 6
12	1 year old	Female Q	hybrid, dark brown	12.6 kg	Enteral 6

Table 3. Histopathological findings and anastomotic burst pressure values of the subjects

	Pl	P2	P3	P4	PS	P6	El	E2	E3	E4	ES	E6
Erosion and/or ulceration in the mucosa	+	+	-	-	-	-	-	-	+	-	-	-
Mucosal Inflammation	++	++	+	+	+	++	+	++	++	++	++	++
PNL	++ +	+++	++	++	++	++	++	++	+++	++	+++	+++
MN	+	+	++	++	++	++	++	++	+	++	+	+
Submucosal Inflammation	++	++	++	++	++	++	++	++	++	++	++	++
PNL	+++	++	++	+	+++	+++	+++	++	+++	++	++	+
MN	+	++	++	+++	+	+	+	++	+	++	++	+++
Serosal Inflammation	++	+	+	+	++	++	++	+++	++	+++	+	+
PNL	+++	+	++	+	+++	+++	+++	+++	+++	+++	+	+
MN	+	+++	++	+++	+	+	+	+	+	+	+++	+++
Necrosis and/or Necrobioss	-	-	+	-	+	-	+	-	-	-	-	-
Fibroblastic Proliferation	+	+	+	++	+	+	+	+	+	+	+	+
Interpretation of Recovery	Poorly	Well	Well	Well	Well	Poory	Well	Poory	Poory	Poory	Well	Well
Burst Pressure (mmHg)	**35**	**270**	**270**	**115**	**15**	**210**	**210**	**35**	**270**	**270**	**270**	**220**

P = Parenteral Grup E = Enteral Grup

Table 4. Enteral and parenteral burst pressure values

	Case	Mean Value	Standard Deviation	Minimum	Maximum
Enteral Group	6	212,5	91,0906	35	270
Parenteral Group	6	152,5	114,0504	15	270

Table 5. Comparison of burst pressure values in albumin and transferrin loss

	Case	Mean Value	Standard Deviation	Minimum	Maximum	p	r
Transferrin %variation	11	19,21593	13,21156	-0,24	33,16	0,037	-0,6313
Albumin %variation	12	11,57257	11,54268	0	38,46	0,047	-0,5826

Table 6. Albumin and transferrin losses of the two groups

	p	z
Transferrin % variation	0,0823	-1,8257
Albumin % variation	0,1320	-1,6126

Although burst pressure values in the enteral group are better than those in the parenteral group, the results are not statistically significant. When the two groups are taken together, the percentage of albumin and transferrin losses on the first and 7th postoperative days shows a statistically significant negative correlation with burst pressure (Table 5). With the Mann-Whitney *U* test, no significant statistical difference was detected between the albumin and transferrin % losses between the two groups (Table 6).

4. Discussion

Malnutrition is a common problem in surgical patients and occurs in approximately 50% of patients. While good nutritional status accelerates wound healing, severe malnutrition delays, stops or complicates wound healing [10,11,12]. Wound healing is prevented in both long and short-term malnutrition. This situation is thought to be caused by the deficiency of amino acids required for collagen synthesis in wound healing and impaired immune dysfunction. The relationship between nutritional status and wound healing is well-known from experimental animal studies. A study revealed that the albumin level of rats fed a protein-free diet decreased, and the burst pressure values in the colon anastomosis were parallel to the albumin level [11].

Again, while total parenteral nutrition (TPN) started early postoperatively has positive effects on colon anastomosis healing, it has been observed to increase the colon anastomosis burst pressure in postoperative EEN [8,12]. In a study conducted on rats, they investigated the effects of EEN on skin and colon anastomosis healing. They reported that early postoperative TPN provided better recovery than the TPN group started on the 3rd postoperative day and the group given only 5% Dextrose, electrolytes and vitamins [12].

In subjects who underwent proximal small bowel anastomosis, the results of EEN application may not be completely similar to those in the colon. Most of the solutions used in both EEN and other enteral nutrition applications are completely or almost completely absorbed from the jejunum and ileum. With the use of EEN in colon anastomosis, it is conceivable that the solution will be largely absorbed by the time it reaches the colon and will not damage the anastomosis. In addition, by providing intraluminal nutrients, the integrity of the GI tract is preserved, the risk of stasis and perforation is reduced, and anastomotic healing is positively affected by stimulating collagen development [13].

In addition, EEN reduces postoperative complications and positively affects the immune system [2,13,14]. However, in the small intestines, especially in proximal small intestine anastomoses, unlike the colon, it can be thought that both the solution itself and the stomach, bile and pancreatic secretions it stimulates may negatively affect anastomosis healing. Our treatment practices of stopping oral intake and reducing secretions to ensure spontaneous fistula tract closure are still valid in patients with gastrointestinal system fistula. Reducing secretions may reduce ischemia due to overvoltage proximal to the obstruction in the presence of obstruction. However, intraluminal nutrient administration increases splanchnic blood flow and stimulates collagen synthesis, suggesting that reducing secretions will not play a positive role in anastomotic healing [13,15].

In the study, improvement in albumin and transferrin values in the enteral group in the late postoperative period is better than in the parenteral group, and the sudden decreases on the second postoperative day are consistent with the literature [16]. Again, although septic complications were not observed in the enteral group, subject no. 4 in the parenteral

group had thrombophlebitis, and subject no. 5 had a surgical site infection with thrombophlebitis, which is consistent with the literature reporting that fewer septic complications are observed in enteral nutrition application [14,16]. Consistent with the literature, we found that albumin, transferrin values and anastomotic burst pressure were low in cases with complications [14]. In this study, when the difference and decreased percentages of the albumin and transferrin values of the cases between the initial period and the 7th postoperative day were evaluated with the anastomotic burst pressure correlation test, a statistically significant negative correlation was detected (p=0.047 for albumin % loss, p=0.037 for transferrin % loss). Here, the correlation ratio of transferrin is higher than the other and is compatible with the literature [16]. These differences are not statistically significant when comparing the two groups with the Mann-Whitney *U* test (p = 0.1320). Its relationship between wound healing and nutritional status is consistent with the literature [10,11,12,16,17]. In one study, they found that the positive effect of albumin on wound healing applied to hypoalbuminemic rats after surgery reached its peak on the 5th day [17].

Many studies have been conducted on anastomotic healing in experimental studies. These include stapler or manual anastomosis, biofragmentable anastomosis ring (BAR)-Valtrac rings, intraoperative lavage with hypertonic glucose and short-chain fatty acids, local application of granulocyte-macrophage colony-stimulating factor-Molgramostim-, and investigation of anastomosis healing after radiotherapy [18,19]. In all these studies and other studies evaluating anastomotic healing, healing is generally evaluated biomechanically by bursting pressure, breaking strength and biochemically by determination of hydroxyproline level and histopathological examinations. In a study on experimental anastomosis healing, they reported that burst pressure measurement was a good parameter in the evaluation of anastomotic healing due to the high risk of wound dehiscence and the fact that the burst occurred in the anastomosis region in the period from 3 to 7 days [7]. In experimental studies, in rats undergoing small intestine anastomosis, there was no correlation between collagen content and anastomosis healing in the first 3-day period when the inflammatory phase dominated, and there was a correlation between collagen content and anastomosis healing in the fibroplasia phase between days 3 and 7. After the 14th day, anastomotic resistance was affected by the suture-carrying capacity. They revealed that it became independent and that the burst pressure generally increased after the 4th day [20]. In this study, anastomosis healing was done with anastomotic burst pressure, histopathological examinations and laboratory data. In this study, EEN and parenteral nutrition were administered to the subjects following jejunal anastomosis. Anastomotic burst pressure measurements were made on the 7th postoperative day to evaluate anastomotic healing in both groups. Although anastomotic burst pressures were higher in the EEN group than in the parenteral nutrition group, the difference was insignificant in the statistical analysis performed with the Mann-Whitney *U* test (p = 0.3173). Although histopathological examination interpreted anastomotic healing as good in 4 subjects and poor in 2 subjects in the parenteral group, good in 3 subjects and poor in 3 subjects in the enteral group, this is a subjective evaluation. In addition, there are points where these findings contradict the anastomotic burst pressure values.

Until the 1990s, the most popular way to provide adequate nutrition to patients was to administer concentrated amino acids, glucose and trace elements intravenously via a central vein. However, in experimental and clinical studies, it has been understood that administering nutrients through the GI route has some important advantages over the intravenous route, especially regarding host defense. In a study, a significantly higher rate of pneumonia, intra-abdominal abscess and empyema was found in patients randomized to TPN compared to those fed enterally. In a meta-analysis of eight randomized controlled trials comparing the effectiveness of enteral and parenteral nutrition in high-risk surgical patients, twice as many PN patients developed one or more septic complications as EN patients (PN 39% vs EN 19%) [14]. In randomized prospective studies on EEN and TPN applications, the effects of the route of nutrition administration were evaluated in patients with multiple trauma, burns or closed head trauma, and it was concluded that parenteral nutrition increased the incidence of pneumonia, intra-abdominal abscess and septic complications compared to enteral nutrition [2,14,21]. In a recent study comparing EEN with parenteral nutrition in elderly patients with gastrointestinal tumors, they found that EEN reduced postoperative complications and length of hospital stay [13].

In the context of digestive tract sepsis, it suggests that response or traumatic injury causes an increase in the permeability of the digestive tract that correlates with the severity of the injury. This increase in permeability allows toxic substances to pass out of the digestive tract. These substances increase the hypermetabolic response to injury and contribute to septic symptoms. Stimulation of the digestive tract with enteral nutrition alleviates this process [2,14]. Although starvation and protein-calorie malnutrition do not cause the translocation of bacteria out of the digestive tract in animal models, the presence of an inflammatory focus, with or without malnutrition, dramatically increases the translocation of bacteria to the mesentery lymph nodes, liver and spleen [13]. Intravenous nutrition per se increases the permeability of the GI tract in animal models [14,21]. This phenomenon is alleviated when glutamine, a specific mucosal nutrient, is added to the TPN solution. While some models show that elemental diets increase the permeability of the digestive tract to bacteria, using more complex enteral

diets or adding fiber to elemental diets prevents the escape of bacteria by ensuring the integrity of the digestive tract [21,22]. In studies aimed at explaining the mechanisms of reduction of sepsis in EEN, significant mucosal atrophy was observed in mouse models administered starvation and IV nutrition. However, this has not been confirmed in human studies. The exact relationship between mucosal atrophy and intestinal permeability due to IV nutrition could not be confirmed.

In addition to the integrity of the mucosa, an important part of the barrier function of the GIS is the intestinal-associated lymph tissue. On average, 50% of the body's immunological structure is located in the GIS, and 80% of the immunoglobulin produced in the body is secreted from the intestinal mucosa as secretory IgA (SlgA). SlgA undertakes immunological defense by binding or agglutinating bacteria, viruses and other toxins within the mucin layer [21]. The small intestine is thought to be the source of most of both intestinal and extraintestinal mucosal immunity. Experimental studies have shown that EEN has many positive effects on anastomosis healing and the immune system. In a study, 56 patients who underwent anastomosis in the GI tract were prospectively examined. Following peroperative placement of the nasoenteral tube distal to the pylorus, EEN was applied at 5 and 6 hours, and 19.5% of the patients had minimal side effects related to EEN. The authors concluded that EEN is also a useful and safe treatment alternative for those undergoing GI surgery [23]. A recent study compared EEN with a parenteral group administered only to patients undergoing small bowel resection. They found that anastomotic healing was better in EEN, hospital stay was shorter, mortality was lower, and gastrointestinal functions improved earlier [24].

5. Conclusion

It is now better known that the route and form of nutrition administration significantly affect the prognosis of critically ill patients. Enteral nutrition is more advantageous than parenteral nutrition in many ways. On the other hand, the development of anastomosis-related complications in patients undergoing anastomosis in the GI tract increases mortality and morbidity rates. When factors such as easy applicability of care services, fewer complications, shorter hospital stay, being more economical, and stimulation of the person's immune system are evaluated together, early enteral nutrition practices should be given more space in our surgical clinics.

This study is valuable because the literature on the application of EEN to subjects undergoing small bowel anastomosis is quite limited. Although it has not been shown that the small bowel anastomosis healing of subjects receiving EEN is superior to the early parenteral nutrition group, new experimental and prospective studies are needed.

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