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Original Article *Özgün Araştırma*

SURGICAL TREATMENT OF PYLORSTENOSIS– FOREIGN EXPERIENCE IN SOMALIA

Somali'de Pilor Stenozunun Cerrahi Tedavisi

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ABSTRACT

Objective: Infantile hypertrophic pyloric stenosis is the most common cause of gastric outlet obstruction in infants within the first month of life. In this study, we aimed to elaborate the diagnosis, hospitalization and surgery procedures of patients with IHPS in Mogadishu, Somalia.

Material and Methods: In this research, 52 patients who were diagnosed with infantile hypertrophic pyloric stenosis and operated at the Recep Tayyip Erdoğan Training and Research Hospital in Mogadishu, Somalia between May 2019 and July 2021 were evaluated retrospectively. Abdominal ultrasonography was performed to all patients. Blood gas parameters were taken from the patient files. Ramstedt piloromyotomy surgical treatment was applied to 52 children.

Results: A total of 52 patients, 18 (34.6%) female and 34 (65.4%) male, were included in the evaluation within the scope of the study. The median age of the patients was 45 days (min: 15 days, max: 150 days), and the median day of discharge was 6 days (min: 3 days, max: 9 days). Wound infection occurred in eight (15.3%) patients, and postoperative recurrent vomiting occured in eight (15.3%) patients. While two patients with vomiting were operated for the second time, it was observed that the complaints of vomiting in six patients improved on the third postoperative day. Postoperatively, 4 (7.69%) of our patients were followed up in the neonatal intensive care unit. There was no death in the cases we operated on.

Conclusion: Infantile hypertrophic pyloric stenosis with non-bilious vomiting is a common condition in infants in Somalia and must be excluded in patients with recurrent non-bilious vomiting. Although the patients were admitted lately, no case of mortality has been observed in this study cohort where surgery conditions and postoperative care standards were below average.

***Keywords**: Somalia, non-bilious vomiting, infantile hypertrophic pyloric stenosis, pyloromyotomy*

ÖZ

Amaç: İnfantil hipertrofik pilor stenozu, bebeklerde yaşamın ilk ayında mide çıkışı obstrüksiyonunun en sık nedenidir. Bu çalışmada, Somali, Mogadişu'da infantil hipertrofik pilor stenozu olan hastaların tanı, hastaneye yatış ve ameliyat prosedürlerini detaylandırmayı amaçladık.

Gereç ve Yöntemler: Bu araştırmada, Mogadişu'da bulunan Recep Tayyip Erdoğan Eğitim ve Araştırma Hastanesi'nde Mayıs 2019-Temmuz 2021 tarihleri arasında infantil hipertrofik pilor stenozu tanısı ile opere edilen 52 hasta retrospektif olarak değerlendirildi. Tüm hastalara abdominal ultrasonografi yapıldı. Kan gazı parametreleri hasta dosyalarından alındı. Ramstedt piloromiyotomi cerrahi tedavisi 52 çocuğa uygulandı.

Bulgular: Çalışma kapsamında değerlendirmeye 18'i (%34.6) kız, 34'ü (%65.4) erkek toplam 52 hasta dahil edildi. Hastaların ortanca yaşı 45 gün (min: 15 gün, maks: 150 gün), ortanca taburculuk günü 6 gündü (min: 3 gün, maks: 9 gün). Sekiz (%15.3) hastada yara enfeksiyonu ve sekiz (%15.3) hastada ameliyat sonrası tekrarlayan kusma görüldü. Kusma şikâyeti olan iki hasta ikinci kez ameliyat edilirken, altı hastada kusma şikayetlerinin postoperatif üçüncü günde düzeldiği gözlendi. Postoperatif dönemde hastalarımızın 4'ü (%7.69) yenidoğan yoğun bakım ünitesinde takip edildi. Ameliyat edilen vakalarda ölüm görülmedi.

Sonuç: Safrasız kusmalı infantil hipertrofik pilor stenozu, Somali'deki bebeklerde sık görülen bir durumdur ve tekrarlayan safrasız kusması olan hastalarda dışlanmalıdır. Hastalar hastaneye geç dönemde getirilmiş olsa da ameliyat koşullarının ve ameliyat sonrası bakım standartlarının ortalamanın altında olduğu bu çalışmada mortalite vakasına rastlanmamıştır.

***Anahtar Kelimeler**: Somali, safralı olmayan kusma, infantil hipertrofik pilorik stenoz, piloromyotomi*

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INTRODUCTION

Infantile hypertrophic pyloric stenosis (IHPS) is the most common cause of gastric outlet obstruction in infants within the first month of life (1). It is seen 4 times more frequently in boys than in girls (2). The disease is typically observed at the 3-6 weeks of age and is manifested by gurgling and non-bilious vomiting followed by feeding, initially several times a day (1,3). If it is not noticed and treated in time, it progresses with severe malnutrition, dehydration and acid-base imbalance, and if neglected, it can result in death. Diagnosis can often be made only by history and a careful clinical examination. Ultrasonography (USG) is the golden standard and although the physician may require barium passage films, which are becoming more common, it is more suitable to be preferred for differential diagnosis (1). Extramucosal pyloromyotomy, which was defined by Ramstedt in 1912, is the most common surgical treatment (4).

Although a hundred years have passed since the definition of IHPS, the etiology of the disease has not been fully explained. Classically it is a disease diagnosed by palpation of a peripyloric mass in the physical examination, with the complaint of non-bilious vomiting after the 2-3 weeks of life (5,6). It is approximately seen in 1 in 300-900 live births in Caucasians, and more rarely in those of Asian and African origin (6). In a study conducted in New York, it was seen in 1.7-2.4 per 1000 live births (2, 6). It is seen 4 times more in boys than girls (2). The incidence of infantile hypertrophic pyloric stenosis differs between countries in Africa. In a hospital data in Ethiopia, IHPS was found in 61 cases out of 4729 live births with a ratio of 12.9 per 1000 live births (6). In South Africa, 52 cases of IHPS were identified between 2002 and 2010. This ratio was calculated as 0.18 per 1000 live births (7). No official data is available for Somalia.

On physical examination, the physician may feel the thickened pyloric muscle as a bullet. However, the golden standard in the diagnosis of IHPS is USG imaging. Pyloric muscle thickness and increased diameter in the abdominal USG can be counted as the main diagnostic parameters (8-10). In the laboratory evaluation, hypochloremic, hypokalemic metabolic alkalosis is detected classically secondary to recurrent vomiting (11).

The golden standard in surgical treatment remains the pyloromyotomy introduced by Ramstedt in 1912 (12). The timing of the surgery varies according to the clinical condition of the baby. If the diagnosis is made in the early term and the electrolyte values of the child are normal, surgery can be performed on the day of diagnosis. If there is dehydration and electrolyte disturbance, surgery should be postponed (13,14).

Data on IHPS patients in developing countries are scarce. In this study, we aimed to elucidate the outcomes of surgically treated patients diagnosed with IHPS in Mogadishu, Recep Tayyip Erdoğan Training and Research Hospital. The duration of admission to the hospital, blood gas values at the time of diagnosis, surgical treatment and complications after surgery have been investigated. Since our institution was the only pediatric surgery clinic in Somalia, children diagnosed with IHPS in other hospitals were referred to our hospital. This research could be positioned as the narrative experience of a certain period in Africa.

MATERIALS AND METHODS

In this study, 52 patients who were diagnosed with IHPS and operated at the Recep Tayyip Erdoğan Training and Research Hospital in Mogadishu, Somalia between May 2019 and July 2021 were evaluated retrospectively. The ethics committee approval has been granted (Somali Recep Tayyip Erdogan Training and Research Hospital Ethics Committee, date: 05.07.2021: issue no: MSTH/6640). The study complied with the Declaration of Helsinki and informed consent has been obtained from all participants.

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Inclusion Criteria: All patients with non-bilious vomiting, an increase in pyloric muscle thickness on ultrasonography and operated in our clinic were included.

Exclusion Criteria: Twelve patients with missing data in their files and 3 patients who were followed up in the intensive care unit with a pre-diagnosis of IHPS but were not operated have been excluded from the study.

Abdominal USG was performed to all patients but 2 patients could not be diagnosed by USG. Eight of our patients were severely malnourished therefore they were admitted by the pediatric clinic and total parenteral nutrition (TPN) treatments were arranged. These patients were transferred for surgery after their clinical status has ameliorated. Ramstedt piloromyotomy surgical treatment was applied to 52 patients via transverse incision in the right upper quadrant. Oral intake was initiated via by nasogastric suction 24 hours after the operation. Two patients were operated for the second time (insufficient pilomyotomy was observed) due to continuous vomiting after the first surgery.

Statistical Analysis: Patient data collected within the scope of the study were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) for Windows 23.0 (IBM Corp., Armonk, NY) package program. Frequency and percentage were given for categorical data, and median, minimum, and maximum descriptive values for continuous data.

RESULTS

A total of 52 patients, 18 (34.6%) female and 34 (65.4%) male, were included in the evaluation within the scope of the study. The median age of the patients was 45 days (min: 15 days, max: 150 days), and the median day of discharge was 6 days (min: 3 days, max: 9 days). The distribution of laboratory parameters was as follows; median pH was 7.58 (min: 41, max: 7.81), median potassium level was 2.87 (min: 1.95, max: 6.9), median sodium level was 129 (min: 106, max: 145), median chlorine level was 91 (min: 57, max: 104) and median bicarbonate level was 37.6 (min: 20.8, max: 58.6).

The most common symptom in patients was vomiting. Lack of weight gain and loss of appetite were other accompanying symptoms. Diagnosis of IHPS was confirmed by abdominal USG. Wound infection occurred in eight (15.3%) patients, and post-op recurrent vomiting in eight (15.3%) patients. While two patients with vomiting were operated for the second time, it was observed that the complaints of vomiting in six patients improved on the third postoperative day. Postoperatively, 4 (7.69%) of our patients were followed up in the neonatal intensive care unit. There was no death in the cases we operated on.

Most of the patients with non-bilious vomiting were referred to us by the pediatric clinic of our institution. Minority of the patients came from other hospitals with a previous diagnosis of pyloric stenosis in the USG. Due to the continuation of the current civil war in Somalia, the financial difficulties of families, the distance from other provinces to Mogadishu and difficulties in transportation, families usually brought their children to the hospital lately.

Majority of the patients were cachectic and their blood gas values were poor. After diagnosis of cachectic patients, TPN treatment was arranged and applied by the pediatric clinic. When the clinical status and blood gas values have ameliorated those individuals were operated.

DISCUSSION

In this study, 52 patients who were diagnosed with IHPS and operated at the Recep Tayyip Erdoğan Training and Research Hospital in Mogadishu, Somalia between May 2019 and July 2021 were evaluated retrospectively. Approximately one third of the patients were (34.6%) female and two thirds (65.4%) were male. The median age of the patients was 45 days and the median day of discharge was 6 days. It was previously mentioned that male to female ratio was 4/1 and this finding was confirmed by Sochaczewski et al., as most of the

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patients in their study were male (15). However, in our study, the male-female ratio was found to be 1.9/1 different from the literature (3).

The pyloromyotomy has first been described by Rammstedt by operating the longitudinal, extramucosal division of the pyloric muscle in 1912 (2,4,16). Although the open surgery techniques have evolved profoundly the pyloromyotomy itself has remained relatively unchanged over the past century. Additionally the laparoscopic pyloromyotomy (LP) was introduced by Alain et al., in 1991 (17). Conventionally, a 3-5mm laparoscopic port and laparoscope are used in the umbilicus alongside a "stab" incision in each hypogastrium. The pyloromyotomy may be performed with electrocautery or an arthrotomy knife. Neonatal laparoscopic surgery is known to be safe and induction of carbon dioxide pneumoperitoneum in neonates has been recently shown to have no impact on brain oxygenation (18).

Postoperative patient management is another important aspect of pyloromyotomy surgery considering the 2-3 weeks old infants. However it is not always possible to achieve standardized post-operative care approach in every institution. In recent studies it was demonstrated that comprehensive care and full enteral feeding is cruical for the successfull outcome of the surgery. A variety of postoperative feeding regimens have been utilized after pyloromyotomy. Many surgeons impose a period of no feeding, with or without nasogastric suctioning, followed by gradual advancement of amounts and strengths of feeds. This traditional cautious approach came about because of concerns about emesis and possible aspiration. A prospective randomized study of three different feeding regimens showed postoperative emesis to be self-limited and independent of the dietary regimen. Retrospective studies have reported shorter postoperative hospital stays in patients receiving accelerated feedings, with either insignificant increase or no increase in vomiting (19,20).

Pyloromyotomy is associated with a low incidence of morbidity and mortality. A retrospective review of a large number of patients from 2 pediatric surgical centers between 1969 and 1994 revealed a 10% overall complication rate (21). No mortality has been observed in our patients. It should be mentioned that this finding was of great importance as it has been achived in relatively poor conditions.

Repeated operations after pyloromyotomy are rarely performed, and are usually due to an incomplete first operation or less commonly an unrecognized perforation. Many investigators recommend conducting a second pyloromyotomy on the other side of the pylorus in this situation (22). Two of the patients were operated for the second time due to recurrent vomiting and insufficient pyloromyotomy. They have recovered after the second operation. Following a successful, second operation infants had gained weight and their general status had improved. Postoperative complications were reported as 0.3% to 12% for wound infection, 0% to 11.5% for mucosal perforation, and 3% to 60% for post-operative vomiting (22). In our study surgical wound infection was higher when compared to other studies (17). Wound infection occurred in 15.3% patients, and postoperative recurrent vomiting in 15.3% patients. Postoperatively, 7.69% of our patients were followed up in the neonatal intensive care unit. The hospital stay was 6 (3-9) days and was similar with the literature (19,20).

The data on pyloric stenosis in African countries is scarce, especially in Somalia. At the same time, when the publications on this geography were examined, the low number of patients is another striking factor. As the institution we had worked was located in Mogadishu, the capital of Somalia, and it was considered as a reference hospital due to having the only pediatric surgery clinic in the country, many cases have been referred to our institution. Therefore, the number of our patients was higher than other publications. There are many private hospitals in Mogadishu where USG, Computerized tomography (CT) and Magnetic

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Resonance Imaging (MRI) examinations can be performed. It is known that even health officials in these hospitals performed surgical operations. However, cases with pyloric stenosis observed in very young infants were referred to our hospital.

The fact that patients and their families arrive at our hospital after a 3-4 day journey by bus and cannot go to Kenya or Ethiopia due to terrorist incidents is thought to be the main reason why the cases were coming to our center later than expected. Another factor in the late arrival of cases was the deficiencies of the healthcare system in Somalia. The main problem was the deterioration of the general condition of delayed cases and the high rate of requirement for intensive care due to fluid and electrolyte imbalances. In Turkey, such advanced cases are not generally encountered.

Since the only pediatric surgery clinic in Somalia was in our institution, patients in other hospitals were referred to our center. The hospital admission age of the patients was 50.5 days, which was quite higher compared to previous literature (15). Families also faced transportation difficulties between other provinces and financial obstacles resulting in prolonged admission time. This led to growth retardation, weight loss and electrolyte imbalance.

When patients with IHPS first came to the hospital, hemogram, electrolytes and blood gas analyzes were performed. Electrolyte values were irregular due to recurrent vomiting. All the patients had hyponatremia, hypokalemia, hypochloremia and metabolic alkalosis at the time of admission which has been emphasized in the previous literature (9,10). The pre-operative hospital stay was later than expected as the electrolyte disturbance had to be corrected and some patients with poor metabolic condition were taken to intensive care before they were prepared for surgery.

IHPS with non-bilious vomiting is a common condition in infants in Somalia and must be excluded in patients with recurrent non-bilious vomiting. Although the patients were admitted lately, no case of mortality has been observed in this study cohort where surgery conditions and post-operative care standards were below average.

Conflict of Interest: None

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Ethics Committe Aproval: Somali Recep Tayyip Erdogan Training and Research Hospital Ethics Committee, date: 05.07.2021: issue no: MSTH/6640.

REFERENCES

1. Puri P, Lakshmanadass G. Hypertrophicpyloric. In: Puri P, ed. Newborn Surgery. Oxford, England. Butter-Worth-Heinemann, 1996:266-71.
2. Applegate MS, Druschel CM. The epidemiology of infantile hypertrophicpyloric stenosis in New York state, 1983 to 1990. Arch Pediatr Adolesc Med. 1995;149(10):1123-9.
3. To T, Wajja A, Wales PW, Langer JC. Population demographic indicators associated with incidence of pyloric stenosis. Arch Pediatr Adolesc Med. 2005;159(6):520-5.
4. Mullassery D, Perry D, Goyal A, Jesudason EC, Losty PD. Surgical practice for infantile hypertrophic pyloric stenosis in the United Kingdom and Ireland—a survey of members of the British Association of Paediatric Surgeons. J Pediatr Surg. 2008;43(6):1227-9.
5. Burge DM, Griffiths DM, Steinbrecher HA, Wheeler RA, eds. Paediatric Surgery. 2nd ed. London. Hodder Arnold, 2006:1027-8.
6. Tadesse A, Gadisa A. Infantile hypertrophic pyloric stenosis: A retrospective study from a tertiary

hospital in Ethiopia. East CentAfr J Surg. 2014;19(1):120-4.

7. Saula PW, Hadley GP. Hypertrophic pyloric stenosis in the third world. Trop Doct. 2011;41(4):204-10.
8. De Laffolie J, Turial S, Heckmann M, Zimmer K, Schier F. Decline in infantile hypertrophic pyloric stenosis in Germany in 2000-2008. Pediatrics 2012;129:e901-6.
9. Touloukian RJ, Higgins E. The spectrum of serum electrolytes in hypertrophic pyloric stenosis. J Pediatr Surg. 1983;18(4):394-7.
10. Nmadu PT. Alterations in serum electrolytes in congenital hypertrophic pyloric stenosis: a study in Nigerian children. Ann Trop Paediatr. 1992,12(2):169-172.
11. Hernanz-Schulman M. Infantile hypertrophic pyloric stenosis. Radiology. 2003;227(2):319-31.
12. Ohri SK, Sackier JM, Singh P. Modified Ramstedt's pyloromyotomy for the treatment of infantile hypertrophic pyloric stenosis. J R Coll Surg Edinb. 1991;36(2):94-6.
13. Aspelund G, Langer JC. Current management of hypertrophic pyloric stenosis. Semin Pediatr Surg. 2007;16(1):27-33.
14. Nasr A, Ein SH. Postoperative pyloric stenosis in the newborn: a forgotten problem. J Pediatr Surg. 2007;42(8):1409-11.
15. Oetzmann von Sochaczewski C, Muensterer OJ. The incidence of infantile hypertrophic pyloric stenosis nearly halved from 2005 to 2017: analysis of German administrative data. Pediatr Surg Int. 2021;37(5):579-85.
16. Taylor ND, Cass DT, Holland AJ. Infantile hypertrophic pyloric stenosis: has anything changed? J Paediatr Child Health. 2013;49(1):33-7.
17. Taqi E, Boutros J, Emil S, Dubé S, Puligandla P, Flageole H, Laberge JM. Evaluation of surgical approaches to pyloromyotomy: a single-center experience. J Pediatr Surg. 2007;42(5):865-8.
18. Chalya PL, Manyama M, Kayange NM, Mabula JB, Massenga A. Infantile hypertrophic pyloric stenosis at a tertiary care hospital in Tanzania: a surgical experience with 102 patients over a 5-year period. BMC Res Notes. 2015;8:690.
19. Jlidi S, Youssef DB, Ghorbel S, Mattoussi N, Khemakhem R, Nouira F et al. Infantile hypertrophic pyloric stenosis. Report of 142 cases. Tunis Med. 2008;86(1):63-7.
20. Kawahara H, Imura K, Nishikawa M, Yagi M, Kubota A. Intravenous atropine treatment in infantile hypertrophic pyloric stenosis. Arch Dis Child. 2002;87(1):71-74.
21. Walker K, Badawi N, Holland AJ, Halliday R. Developmental outcomes following major surgery: what does the literature say? J Paediatr Child Health. 2011;47(11):766-70.
22. Williams R, Black I, Sartorelli K. Re: Early developmental outcome of infants with infantile hypertrophic stenosis. J. Pediatr. Surg. 2011;46(6):1298-9.