

Ewa Wajszczuk¹, Beata Jurkiewicz¹, Joanna Katarzyna Samotyjek¹,
Piotr Kwaśniewicz², Maciej Dadalski³

Received: 09.08.2023

Accepted: 13.05.2024

Published: 11.07.2024

ESWL as an alternative management of pancreatic lithiasis – case report

ESWL jako alternatywna metoda leczenia kamicy trzustkowej – opis przypadku

¹ Department of Paediatric Surgery and Paediatric Urology, Centre of Postgraduate Medical Education, Warsaw, Poland

² Department of Diagnostic Imaging, Independent Public Complex of Healthcare Facilities 'Dzieci Warszawy' in Dziekanów Leśny, Dziekanów Leśny, Poland

³ Department of Gastroenterology, Hepatology, Eating Disorders and Paediatrics, The Children's Memorial Health Institute, Warsaw, Poland

Correspondence: Ewa Justyna Wajszczuk, Department of Paediatric Surgery and Paediatric Urology, Centre of Postgraduate Medical Education, Marii Konopnickiej 65, 05-092 Dziekanów Leśny, Poland, e-mail: ewa.wajszczuk@szpitaldziekanow.pl

 <https://doi.org/10.15557/PiMR.2024.0017>

ORCID iDs

1. Ewa Wajszczuk <https://orcid.org/0000-0002-6668-1297>

2. Beata Jurkiewicz <https://orcid.org/0000-0001-5112-3316>

3. Joanna Katarzyna Samotyjek <https://orcid.org/0000-0002-3955-6685>

4. Piotr Kwaśniewicz <https://orcid.org/0000-0002-9773-948X>

5. Maciej Dadalski <https://orcid.org/0000-0002-2831-8649>

Abstract

Pancreatic lithiasis is a condition rarely seen in the paediatric population. Small pancreatic deposits are treated with endoscopy. For patients with anatomical anomalies, surgery must be performed. Patients already operated on or with no coexisting anomalies may benefit from less invasive treatment. Extracorporeal shock wave lithotripsy (ESWL) is a method dedicated to the treatment of urolithiasis, but since 1989 it has been used for the management of pancreatic stones in the adult population. The aim of this paper is to present the case of a 13-year-old patient with pancreatic lithiasis treated with a combination of endoscopic procedures followed by ESWL of the pancreas. Endoscopic retrograde cholangiopancreatography followed by ESWL were performed. Using the frequency of 1 Hz, and 1,500 pulses, very good disintegration of the deposits was obtained. No complications were observed. ESWL with a combination of endoscopic procedures is an effective and low-invasive method of treating pancreatic stones, and may be used in children.

Keywords: pancreatic lithiasis, ESWL, children

Streszczenie

Kamica trzustkowa to jednostka chorobowa rzadko spotykana w populacji dziecięcej. Drobne złogi zamykające światło przewodu trzustkowego są leczone endoskopowo. Pacjenci z wadami anatomicznymi trzustki poddawani są leczeniu operacyjnemu. Niemniej u pacjentów uprzednio operowanych lub bez wad anatomicznych można spróbować mniej inwazyjnego leczenia. Jakkolwiek litotrypsja pozaustrojowa (*extracorporeal shock wave lithotripsy*, ESWL) jest metodą przeznaczoną do leczenia kamicy moczowej, to jednak od 1989 roku jest wykorzystywana z dobrym efektem również do leczenia kamicy trzustkowej u pacjentów powyżej 18. roku życia. Celem pracy jest prezentacja przypadku 13-letniego chłopca z kamica trzustkową leczonego endoskopowo w połączeniu z ESWL. Po odpowiedniej diagnostyce obrazowej wykonano endoskopową cholangiopankreatografię wsteczną, a następnie ESWL. Zabieg wykonano w znieczuleniu ogólnym. Złóg kruszono z częstotliwością 1 Hz, 1500 uderzeń. Uzyskano bardzo dobrą dezintegrację złoju. Nie obserwowano powikłań. ESWL w połączeniu z leczeniem endoskopowym jest efektywną i małoinwazyjną metodą leczenia kamicy trzustkowej i może być stosowana u dzieci.

Słowa kluczowe: kamica trzustkowa, ESWL, dzieci

INTRODUCTION

Chronic pancreatitis (CP) is mainly seen in adult patients (42–73/100,000) rather than children⁽¹⁾. However, morbidity has risen even 15 times in the last 30 years⁽²⁾.

The main risk factor for pancreatitis in the adult population is alcohol⁽¹⁾. However, it is very uncommon in children. The main aetiological factors in the paediatric population include genetic mutations, autoimmune disorders, and congenital abnormalities⁽³⁾.

The primary symptom of CP is pain. It is most often located in the epigastric region, dull, and of varying severity. As it often occurs after eating, weight loss is seen in some patients due to fear of eating. In addition, pancreatic exocrine and endocrine insufficiency develops over time.

Pancreatic lithiasis is one of the pathognomonic symptoms of CP. Deposits cause obstruction, dilatation, and an increase in pressure in the pancreatic ducts, thus exacerbating pain and aggravating the course of the disease.

In patients with deposits smaller than 5 mm, the first-line therapy is endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy and pancreatic duct stenting^(1,4). The recommended method for treating stones bigger than 5 mm in the adult population is extracorporeal shock wave lithotripsy (ESWL) with the disintegration of deposits to smaller than 3 mm, followed by ERCP^(1,5–7).

The aim of this paper is to describe the case of 13-year-old patient with pancreatic lithiasis who underwent a combination of those two mentioned procedures.

CASE REPORT

A 13-year-old boy was diagnosed with CP at the age of nine. Genetic research revealed mutations in the *SPINK* and *CTRCT* genes. At the age of 10, the patient underwent laparoscopic decompression of the pancreatic tail cyst using the Roux-Y method. Since then, the patient has been under the constant care of the Department of Gastroenterology, Hepatology, Eating Disorders and Paediatrics. He periodically reported mild pain in the epigastrium. A followup ultrasound three years after surgery showed a small pancreas with numerous calcifications. The pancreatic duct was widened almost throughout its entire course to 4–7 mm, and in its lumen, two deposits of about 6 mm long were visible. The patient underwent ERCP. During the procedure, a typical ampulla of Vater was found. After insertion of a pancreatic catheter, fluoroscopy was performed. In the head of pancreas, the pancreatic duct was 6–8 mm wide and despite repeated attempts, the contrast could not pass through two shadows blocking the lumen of the duct. A sphincterotomy was performed.

The patient was referred for ESWL.

Prior to the procedure, a computed tomography (CT) scan was performed to rule out any coexisting anatomical anomalies. There were none, but the pancreas was small, with



Fig. 1. Computed tomography – frontal section. Numerous deposits in the pancreas (white arrow) and dilated duct of Wirsung (measured)

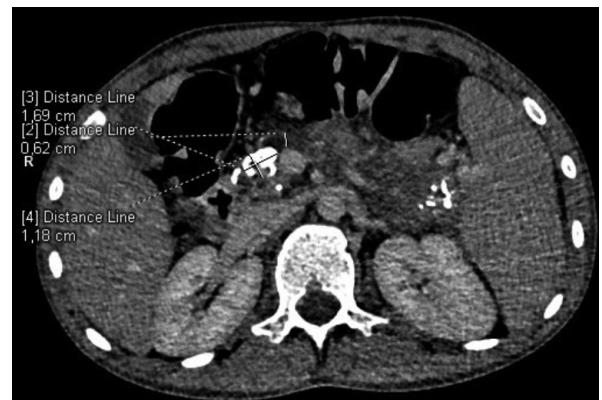


Fig. 2. Computed tomography – cross section. The largest of the deposits, 1.18 × 0.62 cm in diameter, is marked, as well as dilated duct of Wirsung

residual parenchyma and numerous calcifications. The duct of Wirsung was 8 mm wide, with a 6 mm stone in the tail and an agglomeration of stones, 11 mm in size, in the head (Figs. 1, 2).

Final qualification was obtained after an ultrasound examination on the day of ESWL. As previously, the pancreatic duct was wide, and an agglomeration of stones, 16 mm in diameter, next to the ampulla of Vater and 9 mm distally was seen (Fig. 3).

Surgery was performed under general anaesthesia. The patient was placed in a supine position with the right side raised by about 15 degrees.

The procedure was conducted with a lithotripter, using electroconductive technology. The deposits were located

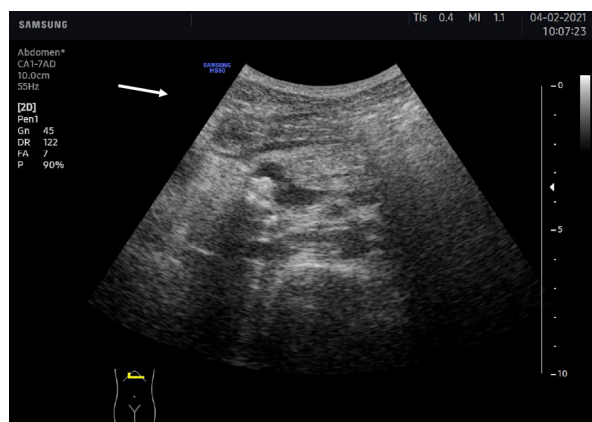


Fig. 3. Ultrasound on the day of ESWL – pancreas with dilated duct of Wirsung (star) and a deposit in the head of the pancreas (white arrow)

by ultrasound. As the manufacturer of the device does not recommend exceeding the dose of 1,500 pulses per treatment, it was decided that the deposits located closer to the ampulla of Vater would be disintegrated first. Using the power of 10–40%, the frequency of 1 Hz and 1,500 pulses, very good disintegration of the deposits was obtained.

The postoperative course was uneventful; the patient did not report any pain, and no increase in alphaamylase was observed in the laboratory tests. In the follow-up ultrasound performed on the day after the procedure, a group of deposits in the area of the ampulla of Vater, 25 × 12 × 15 mm in size, was seen. It was clearly larger than in the pre-treatment examination and with less marked contours.

The patient was transferred to the Department of Paediatric Gastroenterology, where another ERCP was performed.

During ERCP, only small residual deposits in the head of pancreas were seen. There was a stricture in the distal part of the pancreatic duct, which was widened with a balloon catheter (Fig. 4 A, B). An outflow of small deposits was observed. The original plan was to perform another ESWL after 2–3 weeks, however, after the imaging examination it was decided that there were no indications for the procedure any longer.

DISCUSSION

Chronic pancreatitis and pancreatic lithiasis are very rare among children, and they require multispecialist care. Due to the development of technology and skills, ERCP treatments are performed more and more often, and with better results⁽⁴⁾. In patients with large deposits, without anatomical defects of the bile ducts, the ESWL preceding the ERCP procedure is an effective solution. Studies on numerous adult patients have shown high efficacy in the relief of pain and stone clearance after P-ESWL (pancreatic ESWL)^(8,9) and it has become the first-line treatment therapy for patients with large pancreatic calculi and pain⁽⁷⁾. However, the literature for paediatric P-ESWL is still very limited^(10,11). Possible complications of P-ESWL include bleeding, acute pancreatitis (ACE), gastric perforation, and sometimes

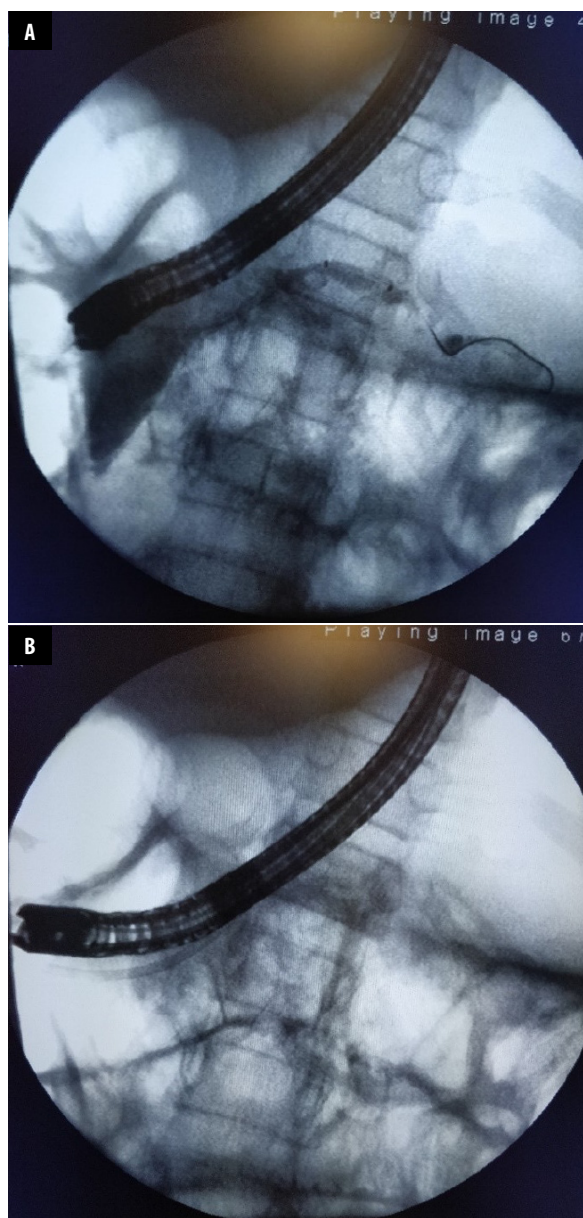


Fig. 4 A, B. ERCP – visible stricture of the duct of Wirsung in the distal part

sepsis. The complication rate in adults is about 6.7%⁽¹²⁾. There is no data on paediatric population.

Previously, an ineffective ERCP in patients with pancreatic stones determined the need for major surgery. ESWL is an alternative therapy that should be considered in these patients.

However, for patients with large deposits and anatomical abnormalities in the pancreatic duct, surgery is still the first-line treatment⁽⁷⁾.

CONCLUSIONS

ESWL with a combination of endoscopic procedures is an effective and low-invasive method of treating pancreatic stones, and may be used in children.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organisations which might negatively affect the content of this publication and/or claim authorship rights to this publication.

Author contribution

Original concept of study: EW, BJ, PK. Collection, recording and/or compilation of data: EW, MD. Analysis and interpretation of data: EW, JKS. Writing of manuscript: EW. Critical review of manuscript: BJ, JKS. Final approval of manuscript: BJ.

References

1. Singh VK, Yadav D, Garg PK: Diagnosis and management of chronic pancreatitis: a review. *JAMA* 2019; 322: 2422–2434.
2. Oracz G, Wejnarska K, Kolodziejczyk E et al.: Pediatric acute and chronic pancreatitis: increase in incidence or increasing awareness? *Pancreas* 2017; 46: e55–e56.
3. Suzuki M, Minowa K, Isayama H et al.: Acute recurrent and chronic pancreatitis in children. *Pediatr Int* 2021; 63: 137–149.
4. Agarwal J, Nageshwar Reddy D, Talukdar R et al.: ERCP in the management of pancreatic diseases in children. *Gastrointest Endosc* 2014; 79: 271–278.
5. Tandan M, Talukdar R, Reddy DN: Management of pancreatic calculi: an update. *Gut Liver* 2016; 10: 873–880.
6. Dumonceau JM, Delhaye M, Tringali A et al.: Endoscopic treatment of chronic pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) guideline – updated August 2018. *Endoscopy* 2019; 51: 179–193.
7. Kitano M, Gress TM, Garg PK et al.: International consensus guidelines on interventional endoscopy in chronic pancreatitis. Recommendations from the working group for the international consensus guidelines for chronic pancreatitis in collaboration with the International Association of Pancreatology, the American Pancreatic Association, the Japan Pancreas Society, and European Pancreatic Club. *Pancreatol* 2020; 20: 1045–1055.
8. Guda NM, Partington S, Freeman ML: Extracorporeal shock wave lithotripsy in the management of chronic calcific pancreatitis: a meta-analysis. *JOP* 2005; 6: 6–12.
9. Tandan M, Nageshwar Reddy D, Talukdar R et al.: ESWL for large pancreatic calculi: report of over 5000 patients. *Pancreatol* 2019; 19: 916–921.
10. Oracz G, Kolodziejczyk E, Sobczynska-Tomaszewska A et al.: The clinical course of hereditary pancreatitis in children – a comprehensive analysis of 41 cases. *Pancreatol* 2016; 16: 535–541.
11. Türer ÖB, Soyer T, Parlak E et al.: Extracorporeal shock wave lithotripsy in the management of a 14-year-old girl with chronic calcific pancreatitis. *Turk J Pediatr* 2020; 62: 685–689.
12. Li BR, Liao Z, Du TT et al.: Risk factors for complications of pancreatic extracorporeal shock wave lithotripsy. *Endoscopy* 2014; 46: 1092–1100.