MEDICINE & PUBLIC HEALTH

2023 JULY–DECEMBER
Volume 1, Number 2

ISSN 2956-9443
www.medphj.com

Andrzej Frycz Modrzewski
Krakow University

„Medicine and Public Health"
Journal of The Andrzej Frycz Modrzewski Krakow University

Website: http://www.medphj.com

ISSN 2956-9443 – the primary version of the journal is the electronic edition

Peer-reviewed Journal

Language editor: David Lilley
Managing editors: Oleg Aleksejczuk, Carmen Stachowicz
Cover design: Ewa Górnisiewicz
Composition and breaking as well as development of illustrative material: Oleg Aleksejczuk

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OFICYNA WYDAWNICZA AFM

Publishing House: AFM Publishing House, https://www.oficyna-afm.pl
Gustawa Herlinga-Grudzińskiego 1, lok. A218, 30-705 Kraków
e-mail: oficyna@uafm.edu.pl

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MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443
2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-000

Introduction

In the second issue of "Medicine and Public Health" readers have the opportunity to enjoy eight interesting articles.

It is important to notice that our journal is drawing the attention of international authors, and hopefully readers as well. This authors of this issue come from four different countries. The authors from Italy share with us an interesting and splendidly illustrated case of a rare internal hernia, the authors from India describe a rare form of liver tumour, while those from Slovakia describe the context of a preventive gynaecological examination.

The Polish authors also share with us several interesting aspects of contemporary medicine. Wąsik et al. review the emerging role of ICG technique in surgery, and Szweda et al. deal with urethral profilometry.

Interesting case reports by Kolendo (a rare complication of arthroscopy) and Józefiak (a rare appendiceal tumour), as well as my own commentary on the current status of lymphadenectomy for gastric cancer, complete this issue.

I very much hope readers will enjoy this issue and that they won't be disappointed.

Andrzej L. Komorowski
Deputy Editor

MEDICINE
& PUBLIC
HEALTH

MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-001
Received: 2023-09-12
Accepted: 2023-11-22

SHORT REPORT

Gynaecological examination in the context of prevention – attendance, attitudes and expectations of women

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Abstract

Background: A gynaecological examination, often as part of a preventive gynaecological examination (PGE), has a legislatively determined content. Despite the efforts of all those involved, women do not attend gynaecological examinations sufficiently often. The aim of this short report is to highlight the current status of women's attendance at PGEs in Slovakia and to present women's expectations as well as the reasons for their attendance at gynaecological examinations.
Material and methods: This paper takes the form of a literature review.
Results: The results of the studies suggest ways to increase women's attendance at PGEs. The communication skills of physicians and nurses/midwives, creating a safe and intimate environment, as well as consistent education about the examination process, are considered key factors in increasing women's participation at a PGE.
Conclusion: Exploring the topic in a broader context may help to understand some of the changing aspects of women's motivation to participate, but more importantly to understand the importance of the attitude of health professionals in gynaecological examinations.
Keywords: preventive gynaecological examination, women's expectations, women's attitudes, prevention, legislative norm

Introduction

Despite the fact that every woman is entitled to a free preventive gynaecological examination (PGE) covered by health insurance and the availability of gynaecological outpatient clinics in our area is sufficient, the number of attendees at PGEs has shown a long-term downward trend. The aim of a PGE is a comprehensive gynaecological screening aimed at the search and early diagnosis of organic and functional disorders of the female genital organs (Act No 577/2004). The examination includes

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a thorough medical history and professional advice on contraception, hormone replacement therapy, prevention of sexually transmitted diseases and advice on the increased risk of gynaecological malignancies associated with a positive family history and the presence of other risk factors in a woman. As follows from the foregoing, a gynaecological examination is always an integral part of a PGE, but a woman may also undergo a gynaecological examination for reasons other than preventive ones (Figure 1).

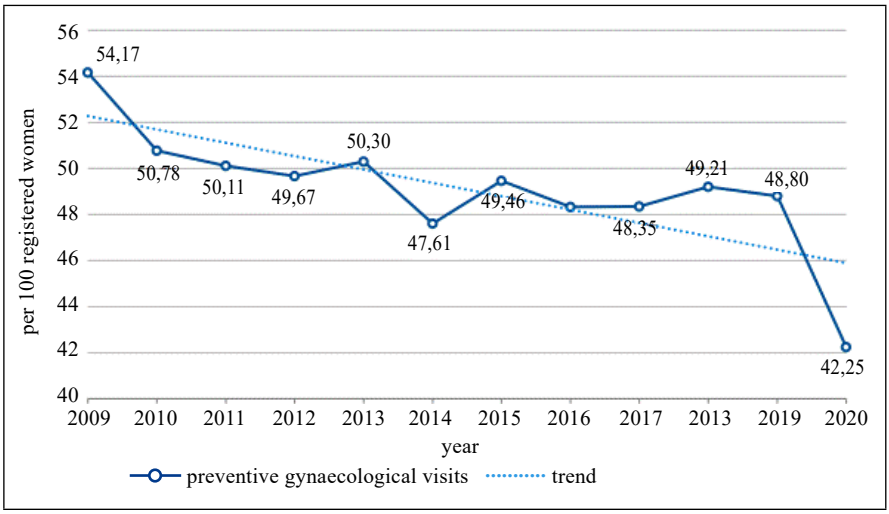

Figure 1. Attendance at PGEs for the period 2009–2020 (NCHI, 2021a)

The prevailing trend abroad is to conduct surveys about women's feelings, experiences and expectations regarding gynaecological examinations. The words intimacy, communication skills, safe environment and support, etc., are emphasized. It has been shown that these expectations play a crucial role as they influence women's motivation and attendance at gynaecological clinics.

Attendance of women at PGE

We relied on statistical data obtained from the National Centre of Health Information (NCHI) in Slovakia, which summarizes data provided by gynaecological outpatient clinics. In 2020, as many as 773,837 PGEs were reported, representing 42.2% of these visits per 100 registered women. Compared to 2019, the number of PGEs had dropped, resulting in a 13.4% year-on-year decrease (based on the total number of possible PGEs in

the given years). This is the lowest annual number of recorded PGEs for the reporting period 2009–2020, probably also due to measures related to the COVID-19 pandemic. In the long term, compared to 2009, there was a 23% decrease in PGEs recorded in 2020. Attendance at PGEs, despite a slight increase in 2013, 2015 as well as 2018, shows a long-term downward trend (Figure 1).

The lowest diagnostic and therapeutic attendance of women for screening and subsequent treatment of a pre-existing condition or disease within the study period (2009–2020) was recorded in 2020. Compared to 2019, a year-on-year decrease of 9.9% was observed (all calculations based on the total number of possible visits), which may also be related to the pandemic measures of COVID-19. In 2020, PGEs accounted for 26.1% of outpatient visits [1].

In Slovakia, preventive medical examinations are fully covered by health insurance companies. At present, there are 3 health insurance companies in Slovakia, one state and two private insurance companies, which currently offer benefits in connection with the PGE, as listed on their websites.

Comparison of PGE conditions in Slovakia and abroad

Table 1 gives an overview of the differences in the conditions, content and intervals of the different components of PGE in selected countries.

Table 1. Comparison of PGEs in selected countries

Country	Age of the 1st gynaecological examination	Oncocytology	Breast examination
Slovakia	From the age of 18 or 1st pregnancy	Aged 23–64, the first two cytology collections at annual intervals. If these two cytology results are negative, repeat examination at 3-year intervals	Palpation: part of every PGE Ultrasound: every 2 years Mammography: from age 40–50
The Czech Republic	From the age of 15	Aged 35–45, covered by health insurance	Palpation: from the age of 25 in women with a positive family history Mammography: from 45 every 2 years

Country	Age of the 1st gynaecological examination	Oncocytology	Breast examination
Poland	From the age of 12–15, usually after the first menstruation, but at the latest before the first sexual intercourse	Free cytology is recommended within 3 years of the beginning of sexual activity (*virgo intacta*: before the age of 25), once every 2–3 years until the age of 59	Ultrasound: aged 20–30 every 2 years, aged 30–40 once a year, over 40 every 6 months Mammography: from 50 to 69 years every 2 years, over 50 once a year
Hungary	After first sexual intercourse, or between the ages of 18–20	Aged 25–65 every 3 years with negative result	Mammography: from 45–65 every 2 years
Italy	From the age of 16–21, or within a year of the first sexual intercourse	From 25 to 64 years of age every 3 years	Mammography: from ages of 45 to 49 every 12–18 months, from 50 to 74 every 2 years

Different countries have set different age ranges of the target population for organized cervical cancer screening programmes (Table 1). On the basis of the analyses of screening issues initiated by the Europe Against Cancer Programme (EACP), groups of experts from 17 European Union member states have developed the European Guidelines for Quality Assurance in Cervical Cancer Programmes [2]. As follows from these guidelines, the screening should start around the age of 20–30 and stop at the age of 60–65 if the last three cytology results are negative.

Attitudes, expectations and reasons for gynaecological examinations in women

PGE and regular screening are also strongly recommended by the WHO [3], which, in one of its publications, draws attention to the fact that there are currently approximately one million women with cervical cancer worldwide who are unaware of their disease because they do not visit a gynaecologist. In order to increase the number of preventive visits to gynaecological clinics with the aim of preventing and identifying any problems, and ensuring early detection of more serious health conditions, including gynaecological cancers at an early stage, many studies have addressed the question of women's attitudes, expectations and reasons for attending or not attending a PGE.

Since the 1970s, many researchers have analyzed the experience of women through gynaecological examinations. During the examination, women are in an extremely vulnerable situation. A gynaecological examination can trigger many negative feelings such as fear of illness, pain,

embarrassment and awkwardness. Many women have negative experiences of gynaecological examinations. Women receive inadequate information about how the examination is to be performed, about the anatomy and physiology of their genitals. The examination procedure can be perceived as very uncomfortable and even humiliating. In addition to the physical discomfort, psychological factors also play an important role, as the gynaecological examination involves the exposure of intimate parts of the body in a vulnerable situation with a loss of control. Women experience many feelings such as embarrassment about undressing, concerns about cleanliness, doubts about vaginal odour, fears that the gynaecologist might find out something about sexual practices, fear of revealing a pathological condition, and fear of pain. Cold instruments, a lack of awareness of the procedure and a lack of care on the part of the gynaecologist are also perceived as important factors. Most of these aspects may be of greater significance when the gynaecologist is male [4].

The embarrassment of exposure can be alleviated by a simple measure such as a wrap skirt, which greatly reduces the discomfort and sense of vulnerability associated with nudity [5].

A Swedish study evaluated more than 520 questionnaires sent to randomly selected Swedish women of childbearing age [6]. The women had positive attitudes towards gynaecological examinations in general, but negative experiences with specific parts of the procedure. The experience of the first examination was more negative than the experience of the last examination. The first gynaecological examination has been shown to be a statistically strong factor for subsequent attitudes towards gynaecological examinations [6,7]. A woman's first gynaecological examination should therefore be used as an opportunity to condition positive emotions as a basis for future positive experiences. The effects of different relaxation methods (aromatherapy, music therapy, etc.) on reducing anxiety about the gynaecological examination are also currently being investigated with positive responses [7]. The temperature of the environment, the choice of wall colours and lighting of the room as well as the overall design of the outpatient clinic have also been shown to have an impact on women's attitudes in this field [8].

The emotional contact between the woman patient and the examining gynaecologist seems to have a great influence on comfort/discomfort during the examination. A Danish study points out that discomfort during gynaecological examinations tends to be associated with a number of factors that are rarely known to gynaecologists, such as a history of sexual abuse, mental health problems and a woman's sex life [9]. Gynaecologists should focus on emotional contact and make full use of their communication skills prior to the examination.

Women often report a feeling of a lack of information about the examination process. They would welcome a verbal description of the different stages of the examination before and during the examination itself – a warning about possible soreness, coldness and touch. A negative experience of a gynaecological examination correlates with a woman patient's lack of knowledge [10]. Reasons such as lack of time, workload, discomfort due to shyness, fear of illness/bad results have been reported across studies examining this issue. Research involving 106 respondents has also shown that shame, fear of the gynaecologist (of not receiving a positive result), as well as a lack of awareness of the possible risks of not attending preventive check-ups, are frequent barriers to attending PGE [11]. In 2011, a British survey with 1515 woman patients reported the shame of telling the doctor about their problems (47%), but also inconvenient appointment options (35%), as the main reasons for not attending a PGE [12].

Workload and the feeling that visiting a gynaecologist is futile unless a woman has problems are also leading reasons for neglecting a PGE [13]. Similarly, a study on a sample of 1000 Slovak women showed that the most common barrier for those women who do not visit a gynaecologist is the belief that they do not need to go for a PGE unless they have health problems. The study also showed a lack of awareness among women. To increase awareness, the author recommends leaflets from the doctor or pharmacy as the most appropriate source of information, which has proved to be the first spontaneously named source and, after a conversation with the doctor, also the most trustworthy. The internet, mainly used by younger age groups, is also a suitable communication channel, being considered by respondents as the most important, intimate and detailed source of information about the course of gynaecological examinations. Journals and women's magazines also appear to be a suitable platform for the most simple communication campaigns [14].

Another study showed that women perceive the importance of a PGE and that important factors that motivate them to undergo a PGE are trust, discretion, sensitivity, communication and the gynaecologist's expertise [15]. Another piece of research pointed out that awareness of PGE is sufficient, but less than half of women (44.09%) actually perform a breast self-examination [16]. It has also been revealed that only 15.2% of university female students regularly perform a breast self-examination [17], and around 37% of women do not consider breast self-examination to be important, which is worrying in the context of the risk of breast cancer [18].

Awareness, education and lifestyle are not the only parameters that influence women's participation at PGEs. It is also determined by women's

own attitudes towards the importance of PGEs, as well as the fear of a serious disease [19]. Therefore, it is necessary to inform women in a broader context about the risks associated with the occurrence of these diseases, but also about ways in which they can be prevented. The most effective tools in this field are direct contact with women, for example, in the form of an SMS or an invitation to a PGE [20].

It can be concluded that across studies the following have been found to be the principal reasons why women do not undergo gynaecological examinations: discomfort and shyness, fear of illness/bad results, a lack of the perception of its importance, a lack of time and workload. In the course of the examination, women particularly expect clear communication, a sensitive approach, a thorough explanation of the results of the examination and protection of intimacy by health professionals, which appear to be more of a priority for women than the expertise and experience of the gynaecologist.

Conclusion

The contribution of this paper can be linked to the fact that we have identified an area in which women's motivation for PGE attendance can be improved: a personal approach, sensitive communication and the professionalism of health professionals (gynaecologists, midwives, nurses). The prevention platform has an important position in this issue. The communication skills of doctors and nurses/midwives, the creation of a safe and intimate environment and consistent education about the examination process are considered key factors in increasing women's participation at PGEs.

Funding

This short report was written with funding from the project KEGA 016-UK-4/2021 „Štandardizovaný pacient v pôrodnej asistencii“ (“Standardized patient in midwifery”).

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MEDICINE
& PUBLIC
HEALTH

MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-002
Received: 2023-10-23
Accepted: 2023-11-19

REVIEW PAPER / META-ANALYSIS

The application of ICG in surgical fields of medicine – a short narrative review

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Abstract

Background: Intraoperative near-infrared imaging using indocyanine green (ICG) has been increasingly used in procedural medical fields in recent years. The purpose of our work is to provide a general overview of the use of indocyanine green in procedural medical fields. We reviewed publications posted in PubMed, whose authors used ICG in their research, but also daily surgical practice. Many large studies have demonstrated the usefulness of this method. Currently, new directions for the use of this dye are being sought. In the future, the use of ICG in near-infrared (NIR) imaging may become a standard used in daily medical practice.
Material and methods: A review of the available literature was conducted using the PubMed. The search terms 'ICG', ''indocyanine green', 'indocyanine green fluorescence', and 'NIR' were used.
Results: We analyzed several dozen articles from the large database available in PubMed. ICG is currently used in many different fields of medicine. Below we list the applications found in this review.
Conclusions: Indocyanine green has demonstrated utility across various surgical disciplines within the medical field. A growing body of research has elucidated the multiple advantages conferred by this dye, thereby propelling its increased adoption by researchers and practitioners. Despite these advances, there remains a need for extensive research before ICG can be integrated into routine clinical applications.
Keywords: ICG, indocyanine green, fluorescence, near-infrared (NIR) imaging, intraoperative imaging

Introduction

The origins of indocyanine green (ICG) use in medicine date back to the 1960s, when it was approved for clinical use in the USA by the FDA (Food and Drug Administration). It was originally used mainly in ophthalmology

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[1,2]. Since its introduction, it has been the most widely used fluorescent dye. ICG is a tricarbocyanine dye with very high water hydrophilic properties. Depending on the indication, and the pathology one wants to detect, it can be administered intravenously (usually a dose of 5 mg) or topically, even submucosally (usually a dose of 5–6.25 mg) [3–5].

The fluorophore remains confined in the intravascular compartment until it is eliminated. In due course after excitation, it provides tissue perfusion information [6]. The imaging technique using ICG is based on the use of a medical CCD (charge-coupled device) camera to capture the near-infrared light that is emitted when the indocyanine green molecule binds to α1 lipoprotein in the blood, thus allowing visualization of tissues in the living body [7].

Initially, only a handheld NIR camera was developed to assess blood flow by detecting intravascular ICG fluorescence. Today, a laparoscopic camera is more commonly used, making ICG angiography available for use in minimally invasive surgery, both laparoscopic and robotic. The cameras used in laparoscopic and robotic surgery are designed to operate in both conventional white-light mode but are then activated in NIR mode after ICG is applied [8]. The excitation wavelength of ICG is in the near-infrared wavelength range between 750 and 810 nm, and the maximum fluorescence wavelength in plasma is 845 nm enabling distinguishing structures about 1 cm deep in the tissue [9,10]. The test is based on the administration of ICG into the body and stimulation with infrared light. Infrared fluorescence is then generated, which is then recorded with a photodynamic eye (PDE) and observed using contrast [4]. The procedure using indocyanine green is readily available, inexpensive to use, and, most importantly, non-toxic to the patient [3,7]. ICG has found wide application in the surgical fields of medicine. It is used both in elective procedures and for vital indications, providing intraoperative information on tissue, and organ perfusion, and thus having a significant impact on decision-making [11].

This short narrative review aims to provide the audience with possible-applicationsofICG fluorescence in everyday clinical practice.

Methods

A review of the available literature was conducted using the PubMed. The search terms ‘ICG’, ‘indocyanine green’, ‘indocyanine green fluorescence’, and ‘NIR’ were used.

Results

We analyzed several dozen articles from the large database available in PubMed. ICG is currently used in many different fields of medicine. Below we list the applications found in this review.

Pancreatic Surgery

In a study by Newton and colleagues, during pancreatectomy, dye reliably accumulated within malignant pancreatic tumors, thus showing very accurate tumor borders, which is invaluable for intraoperative assessment of margins and extent of disease [12].

Biliary Tract Surgery

Currently, ICG plays a significant role in identifying the cystic duct and common bile duct. The study, which was conducted by Broderick and colleagues, compared surgery time, conversion rate to open surgery, and hospitalization time, in patients who used ICG to visualize the bile ducts and without using ICG visualization. The results of this study are promising; in the group of patients who used indocyanine green imaging, leading to improved patient outcomes concerning operative times, decreased conversion to open procedures, and shorter length of hospitalization. However, there was no significant difference at 30 days after surgery in the two groups. Similar findings were presented in their review paper by Serban and colleagues. In conclusion, the use of ICG is considered a promising tool to increase the safety of biliary identification [13,14].

Liver surgery

It is also an indispensable part of liver surgery. It allows the detection of intrahepatic bile leakage after liver resection. In addition, liver tumors are imaged with ICG, which also provides the opportunity to identify well-differentiated hepatocellular carcinoma tumors [15]. Intraoperative ICG staining is considered important in minimally invasive liver resection. In Fujiyama's study, when ICG was observed through a camera system, a clear ICG border appeared on the liver surface between fluorescent areas, with the liver preserved, and non-fluorescent areas, with the liver resected. Significant in this study was the presence of a demarcation line both on the liver surface and within the parenchyma. The key role of intraoperative staining with indocyanine green was demonstrated in this study [16].

Mainly, two staining methods are currently in use: positive staining, where ICG is injected into the portal vein to stain the liver segment to be resected, and negative staining, where ICG is injected intravenously, staining the liver except for the segment with clamped inflow [17]. The need for standardization and further validation of oncologic outcomes of proposed methods can be a drawback, and this applies in all fields of use. Securing the surgical margin, intraoperative cholangiography, and detection of

subcapsular hepatic tumors also reinforce the arsenal of the hepato-pancreato-biliary surgeon [18].

Colorectal surgery

ICG facilitates imaging of organs at risk of intraoperative damage, e.g.: ureters during rectal cancer surgery. When the tumor is located in a difficult area, fluorescence provides real-time angiography of the vascularization of the tumor area for vascular dissection, and thus safe intervention and greater oncologic purity [19]. It plays a very important role in assessing the perfusion of the rectal stump, which is important in assessing the risk of anastomotic leakage [20]. Fluorescence imaging with indocyanine green has been proven in many studies to be an effective tool for assessing anastomotic perfusion [21,22]. A regimen of administering the dye 2 times during each surgical procedure has been developed. First, ICG was injected intravenously after transection of the mesentery and central vessels along the planned transection line, but before the anastomosis was performed. Then, after the anastomosis is performed, another bolus is injected to confirm the perfusion of the anastomosis [19]. A study by Son and colleagues showed a decrease from 10% to 1–2% in complications related to intestinal anastomotic leaks [8].

Urology and Gynecology

ICG also has applications in urology and gynecology. It has been shown to provide high-precision imaging of anemic structures, identifying key anatomical elements and pathological structures, significantly improving surgical outcomes. In the detection of the sentinel node in surgical protocols of gynecologic oncology a 95–98% success rate is estimated, and in the case of vulvar cancer SNL (sentinel node) detection is at 100% [23–26].

Head and neck surgery

This dye is very important in determining the exact location of tumor lesions, its margin, and visualization of surrounding structures located within the head and neck, allowing for better perioperative results, better "oncologic purity," and longer progression-free time [27]. Auspicious results have been observed especially in pituitary tumors, the use of indocyanine green allows the removal of lesions within the healthy margin, while safely preserving the healthy gland, without excessive resection [28–30].

Microsurgery

In microneurosurgery, ICG has emerged as a very promising tool to reduce the risk of perioperative vascular damage during ventriculostomy, the standard treatment for hydrocephalus [31].

Adrenal gland surgery

It has also been shown to be very useful in adrenal surgery, the primary usefulness of ICG fluorescence in adrenal surgery is to help delineate adrenal resection margins, allowing for more precise resection. This is especially true for patients with bilateral adrenal disease or hereditary disease associated with a high risk of recurrence [32].

Vascular surgery

It also appears to be very helpful in assessing the geometry of aneurysms in the brain, as well as surrounding vessels. A study evaluating 16 patients surgically treated for unruptured cerebral aneurysms demonstrated the usefulness of using indocyanine green for endoscopic and microscopic angiography. Endoscopic and microscopic angiography were compared, with ICG playing a major role in both. Better brain vessel imaging results were obtained with endoscopic imaging. It is expected that the introduction of this type of imaging into daily practice will be possible shortly [33].

Breast surgery

In breast surgery, ICG is used to identify sentinel nodes in breast cancer patients. In a study by Guo and colleagues, the percentage of detecting sentinel nodes in women with early breast cancer was higher than using methylene blue. The difference was almost 10% in favor of indocyanine green. However, the best results were shown with a combination of the two methods, with an efficiency of almost 100% [34]. The use of ICG has been investigated for the assessment of mastectomy skin flap ischemia. Indocyanine green angiography can assist in locating poorly perfused areas intra-operatively. With high intraoperative accuracy, it can predict postoperative outcomes [35].

Pediatric surgery

In pediatric surgery, ICG is used in hepatoportoenterostomy (HPE) with the Kasai procedure, which is the treatment of choice for biliary atresia (BA). Hirayama and colleagues suggested that the use of an ICG cholangiogram can better visualize the biliary flow of the hepatic duct at the porta hepatis

before dissecting the fibrous cone, thus a more appropriate level and extent of dissection can be determined. It can also be used to evaluate biliary excretion post-operatively by observing the fluorescence of the feces and comparing it to the pre-operative value [36]. Indocyanine green is increasingly applied in pediatric surgical oncology. Esposito and colleagues used ICG in 18 patients undergoing open surgery for head, neck and chest tumors. Histopathology reports confirmed complete mass excision in all the cases. They assessed that ICG may be useful in pediatric surgery [37].

Bariatric Surgery

Staple line leaks remain a profound complication after bariatric surgical procedures. Kalmar and colleagues conducted a retrospective cohort study of all bariatric patients undergoing Roux-en-Y gastric bypass or sleeve gastrectomy procedures performed by one attending surgeon at a tertiary care facility designated as a bariatric surgical center of excellence. "Indocyanine green leak testing had a sensitivity of 100.00% and specificity of 98.28%." [38:4194]. In their study showed indocyanine green is an alternative for intraoperative detection leaks in the staple during bariatric surgical procedures with comparable specificity to intraoperative gastroscopy [38]. Mongelli and colleagues in their study evaluate the usefulness of indocyanine green angiography during conversional or revisional bariatric surgery in patients qualified for re-operation. In their study, postoperative complications, operative time, and length of hospital stay were similar in groups that use ICG and without ICG. It was assessed that indocyanine green was not useful in assessing the blood supply to the gastric pouch [39].

Future applications

The technology of the NIR visualization also changes with time. In their study van Oosterom et al. introduce a novel Click-On fluorescence-based sensing technology for existing robotic surgical instruments, effectively transforming standard forceps into molecular sensing apparatuses. This sensing modality demonstrated the capacity to detect ICG in tissue consistently throughout various stages of surgical procedures, irrespective of the fluorescence laparoscope model and its configurations [40].

Frontier research groups provide promising data in the field of contrast-based targeted therapy for cancer. ICG-conjugated gemcitabine showed less toxicity to normal cells and superior anti-tumor action compared to gemcitabine alone in a subcutaneous tumor xenograft model. This suggests that ICG conjugation can provide a novel fluorescent drug delivery system for the treatment of liver cancer, offering a method that can be used for both diagnosis and treatment of HCC [41].

The utilization of ICG fluorescence, particularly when integrated with sophisticated advanced artificial intelligence, holds the potential for enhancing surgical training. This combination could offer surgeons a data-driven roadmap and facilitate a more individualized decision-making process in the operating theater.

Conclusions

Indocyanine green has demonstrated utility across various surgical disciplines within the medical field. A growing body of research has elucidated the multiple advantages conferred by this dye, thereby propelling its increased adoption by researchers and practitioners. Despite these advances, there remains a need for extensive research before ICG can be integrated into routine clinical applications.

Our experiences with ICG

In our daily work, we have used indocyanine green in cholecystectomy many times. Below there are photos of several of our procedures (Figure 1–4).

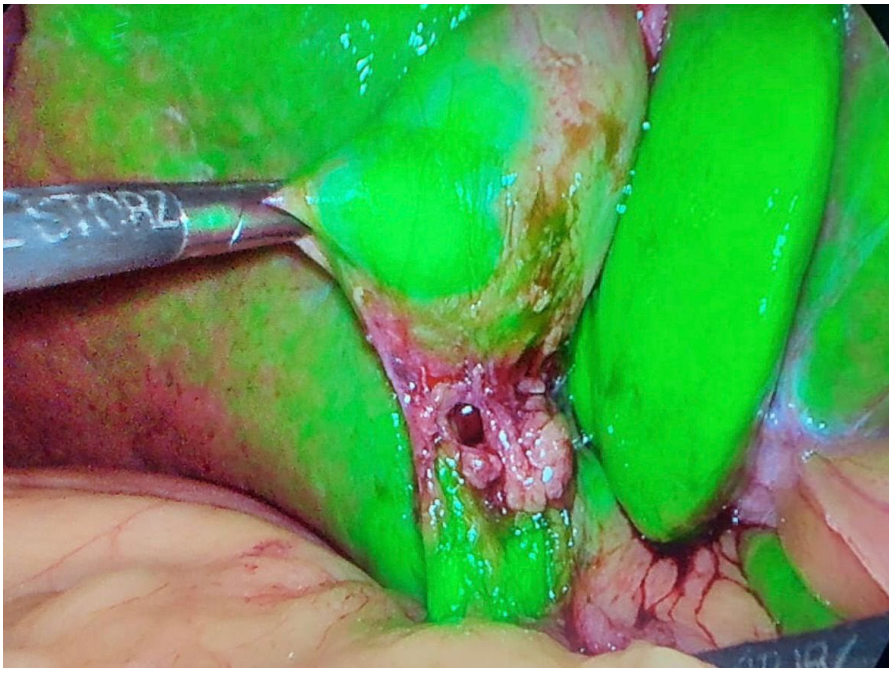

Figure 1. Gallbladder with chronic inflammation in NIR. Photo courtesy prof. Andrzej Komorowski.

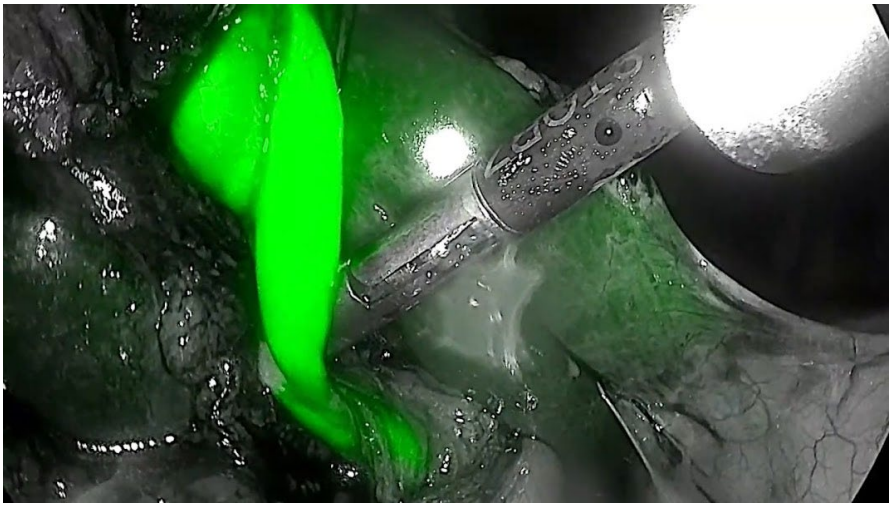

Figure 2. Cystic duct dissection. Photo by Oleksii Potapov.

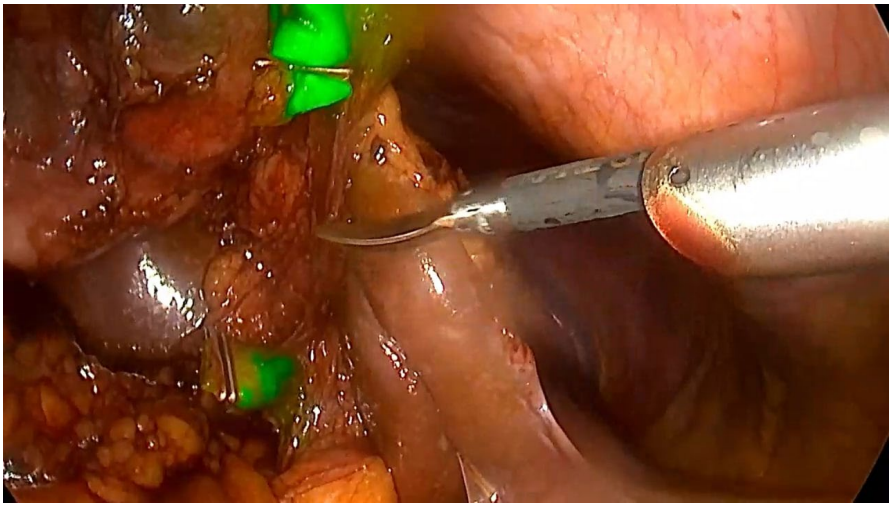

Figure 3. Remnant signal in a stump of the cystic duct. Photo by Oleksii Potapov.

Figure 4. View of the specimen using an external NIR camera. Photo by Magdalena Wąsik.

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MEDICINE
& PUBLIC
HEALTH

MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-003
Received: 2023-02-15
Accepted: 2023-11-19

REVIEW PAPER / META-ANALYSIS

Urethral Profilometry – should it be discarded?

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Abstract

Background: Urethral profilometry was developed as a scientific research method rather than for everyday clinical use. However, it was implemented as an integral part of urodynamic diagnostics for clinical use. Although it has been used for over 70 years, there are still no clear guidelines, either for the technique or for the indications and interpretation of the data obtained in this study. There are many inaccuracies and doubts about the method.
Material and methods: The authors of this manuscript present a review of the options for urethral function diagnostics and the position of urethral profilometry among them. The literature and clinical aspects of their investigation are discussed in this article. The sources of the limitations of urethral profilometry and their importance in clinical practice and the interpretation of results are analyzed.
Results: Urethral profilometry has many limitations. Their sources are urethral anatomy and structure, equipment, patient collaboration and the examination technique. The repeatability is debatable, but doubts surrounding it seem to be exaggerated. Despite all this many valuable data can be obtained by performing an examination.
Conclusions: Despite the limitations, urethral profilometry is a useful clinical tool for functional diagnostics of the urethra. Developing precise guidelines regarding indications, technique and interpretation of the assessment would be essential in order to take advantage of this diagnostic method.
Keywords: incontinence, urethral profilometry, urodynamics, urethra

Introduction

In the 1970s, Patrick Bates uttered the famous sentence '[t]he bladder is an unreliable witness' [1]. In a significant percentage of patients, subjectively reported symptoms are difficult to reproduce during diagnostic tests, and the effects of treatment based solely on the history, physical examination and knowledge of the anatomy and physiology of the lower urinary tract have been unsatisfactory for many years. The prevalence of at least one lower urinary tract symptom (LUTS) at least 'sometimes' is 72.3% for men

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and 76.3% for women, and 47.9% and 52.5% for at least 'often' for men and women, respectively [2]. The group of patients that need to be properly diagnosed is large.

Therefore, a method was sought that would allow the function of the lower urinary tract to be objectively assessed and, therefore, the results of the treatment of lower urinary tract symptoms to be improved [3]. The technique of cystometric examination, the technique in [4], was first described at the end of the 19th century, but it was not until the middle of the 20th century that modern urodynamic diagnostics, including urethral profilometry, was fully developed as a method of detailed assessment of urethral function.

Urethral function is crucial in many LUTS – not only urinary continence but also bladder overactivity, which is secondary to urethral stricture or sphincter hyperactivity and dysfunction in proper emptying of the bladder. The function of the bladder, urethra, or pelvic floor needs to be well coordinated. In response to the need for functional assessment of the urethra, urethral profilometry was developed as a part of urodynamic diagnostics. It was supposed to be a research tool [5], but it was implemented in clinics as a routine part of urodynamics. The current standards for performing urethral profilometry are defined in the document of the Standardization Committee of the International Continence Society [6].

The Urethra

The urethra develops from the endoderm and from the visceral mesoderm. Around the seventh week of pregnancy, the cloaca separates into the urogenital sinus and rectum, then the lower part of the vagina and the bladder and urethra separate from the urogenital sinus, which occurs around twelve weeks of gestation.

The average length of this tubular structure in females is 2.5 to 5.1 cm [7,8], and the diameter is about 5 to 7 mm. The internal orifice of the urethra is connected to the neck of the bladder, and the external orifice ends anteriorly in the vestibule of the vagina.

The fascial tissues covering the urethra connect to the tendinous arches of the pelvic floor and the levator ani muscle. At rest, with normal pelvic floor tension and correct anatomical relations, they guarantee the anatomical position of the urethra.

Smooth muscle layers innervated by the cholinergic system, whose fibers are arranged along the urethra (outer layer) and around it (inner layer), do not seem to be of key importance in maintaining urethral tone [3]. However, the inner layer's circular filaments help to maintain the basic urethral tonus. The

urethral sphincter is made of type I striated muscle fibers (slow twitch fibers) that can maintain contraction and high tone for a long time. It surrounds the distal two-thirds of the urethra, but it is believed that most of these fibers are in the middle 1/3 of the urethra. The sphincter is horseshoe-shaped, opened dorsally, and the fibers are divided into intramural and periurethral ones. They are fixed to the anterior vaginal wall. The shape of the sphincter is not without significance in the mechanisms of urinary continence and their assessment [9]. Additional muscle fibers in the distal portion of the urethra form the urethro-vaginal sphincter, whose contraction is conditioned by the contraction of the bulbospongiosus muscle. The pubourethral ligaments are located between the twentieth and sixtieth percentile of the length of the urethra and attach to the lower arm of the pubic bone and the tendon arch of the pelvic floor fascia, where it meets the arch of the levator ani. They determine the proper mobility of the urethra and stabilize its position during an increase in abdominal pressure or provocative tests [10–13].

For many decades, the urethra was perceived only as a tubular structure dedicated to the outflow of urine from the bladder. The current understanding is much broader. The two main functions of the urethra are urinary continence during the filling phase of the bladder and to facilitate emptying of the bladder during physiological voiding. It seems, however, that the function of this organ is much more complex [14].

The correct urinary continence mechanism is based on balancing intravesical pressure and intra-abdominal pressure at rest, as well as counteracting increases in abdominal pressure during exercise by increased intraurethral pressure. Physiologically, between voids, intraurethral pressure slowly increases in response to the gradual filling of the bladder. During micturition, the relaxation of the urethra and pelvic floor, associated with an decrease in intraurethral pressure, precedes the contraction of the detrusor by about five seconds, being the mechanism that activates normal micturition physiology [15].

In the 1970s, the critical zone of the urethra, which is most important for urinary continence, was defined for the first time as the ‘continence zone’. This is the area where the highest intraurethral pressures are located [16], which is crucial for urinary continence.

Urethral pathology

The main function of the urethra is urinary continence on the one hand and bladder emptying on the other. Proper coordination of the urethra, pelvic floor and bladder is necessary for both continence and bladder emptying. A disturbance in one element will affect the function of the others. Impaired

urethral stabilization by the pubourethral ligaments, weakness of the pelvic floor muscles and urethral sphincter leads to urinary incontinence. Bladder overactivity is a cause of urge incontinence. Disturbed neuroregulation of the lower urinary tract and pelvic floor leads to discoordination and vesico-urethral dyssynergia with different clinical manifestations possible, starting from frequency and nocturia, urgency, dysfunctional voiding and overflow incontinence.

In the diagnostic algorithm, there are a few steps to go through, depending on what pathology is suspected. Urodynamics with or without urethral profilometry is one of the elements of in-depth diagnostics, performed in its later stages rather than as basic research [17]. As it is optimal to avoid overdiagnosing and overtreatment in our daily clinical practice, it is worth knowing when to perform a particular test. Asking clinical questions based on anamnesis and a detailed clinical examination allows the diagnostics to be planned correctly and effectively.

Diagnostic tools

There are several methods for assessment of the lower urinary tract, particularly the urethra.

Ultrasonography

Using ultrasound imaging of the urethra, its anatomy, rather than function, can be examined. The parameters assessed by sonography are the total urethral length (TUL), urethral mobility that indirectly testifies to the function of the pubourethral ligaments, stabilization of the urethra in order to maintain continence, and such anatomical pathologies as urolithiasis, diverticula, periurethral cysts. These latter can, of course, influence the continence and bladder-emptying mechanisms, but are not strictly functional. In patients with stress urinary incontinence, the presence of bladder neck funneling and urethral hypermobility is more frequent than in continent women. These, however, are not phenomena that determine diagnostic and therapeutic decisions [18,19]. According to the latest guidelines, ultrasound is routinely used in the assessment of residual urine after voiding (PVR – post void residual) in patients with stress urinary incontinence (SUI) [20]. The International Continence Society does not recommend the routine use of ultrasonography in the diagnosis of urinary incontinence, considering it to be an additional examination in patients with recurrent symptoms or with complex symptoms [21]. Furthermore, the SUI diagnoses and transperineal ultrasound findings were not connected to the urodynamic findings [22].

More sophisticated imaging methods, such as MRI or CT, are not recommended in routine diagnostics of the urethral function as they are not cost-effective.

Urethrography

Retrograde urethrography (RUG) is used as the investigation method of choice to evaluate the stricture presence, location, length, and any associated anomalies (e.g., false passages, diverticula) [23]. However, it is not a method for functional assessment of the urethra. Combining RUG with voiding cystourethrography (VCUG) can allow adequate and meticulous visualization of the urethra and a more accurate assessment of stricture length in (nearly) obliterative strictures, stenoses and gaps in pelvic fracture urethral injury (PFUI) [24]. This method can be used as an element of videourodynamics, which is rarely performed (among others, in the diagnosis of neurogenic LUTS). A functional radiological examination may show diverticulosis of the bladder and urethra, bladder obstruction (both functional, e.g., lack of relaxation of the bladder neck during micturition, and anatomical, e.g., urethral stenosis), static disorders of the pelvic organs affecting the anatomy of the lower urinary tract, and can assess the presence and nature of any fistulae. As an initial imaging test, ultrasound is more often used as a less invasive test than urethrocystography.

Endoscopy

Endoscopic examination – urethrocystoscopy – is a useful method in the assessment of the anatomy of the urinary tract, but it is of limited use in functional examination. Apart from oncological diagnostics, urethrocystoscopy may be useful in the diagnosis of fistulas, urethral diverticula, as well as in the diagnosis of hematuria, pain, and in the case of suspected bladder obstruction. As an invasive procedure, it is rarely recommended as a first-line diagnostic tool [25].

Urodynamics

A urodynamic study is the most detailed functional assessment tool for the lower urinary tract. Precise and comprehensive assessment of urethral function is based on urethral pressure profilometry (UPP). Resting (static urethral pressure profile at rest – UPPR) and dynamic (dynamic urethral pressure profile at stress – UPPS) profilometry tests are performed. Voiding profilometry is rarely performed (the test is used rarely and only in selected centers in the diagnosis of bladder obstruction) [3,26,27]. Maximal urethral pressure (MUP), the primary measured parameter, is defined as the fluid

pressure required to open a collapsed urethra. It is possible to measure the pressure values at specific points of the urethra (point pressures), but the essence of urethral profilometry is the measurement of individual parameters along the entire length of the urethra, which gives the urethral pressure profile [6]. The resting profilometry test consists of measuring the intraurethral pressure along the entire length of the urethra, with the simultaneous measurement of the intravesical pressure at rest. Based on these measurements, the function of the urethra is comprehensively assessed. Simultaneous measurement of intravesical pressure allows the the maximum urethral closure pressure (MUCP) to be assessed, the other, apart from intraurethral pressure, basic parameter in urethral profilometry. During stress profilometry, the catheter is withdrawn along the urethra while intraurethral and intravesical pressures are continuously measured, and the patient repeatedly coughs or performs Valsalva maneuvers. This test allows the transmission of abdominal pressures to the urethra to be assessed. If the pressure in the urethra during stress testing and at rest surpasses the intravesical and abdominal pressures, the condition for proper urinary continence is met. Stress profilometry is a more reliable test in the assessment of patients with urinary incontinence compared to resting profilometry [26]. SUI is not the only condition in which profilometry can be used. Urethral sphincter hyperactivity and relaxation impairment, leading to bladder outflow functional obstruction, are common but rarely correctly diagnosed conditions that can be assessed only by performing urethral profilometry with intraurethral pressure measurement. Although there is a lot of medical data concerning it, urethral profilometry is criticized for being of low reproducibility and unreliable as a diagnostic tool.

To discuss the clinical utility of urethral profilometry, one must take into account different factors that can influence the method and its results.

Potential problems

The first problem is the anatomy of the urethra. One thing that generates intraurethral pressuresis is the urethral sphincter. It does not surround the whole urethral circumference but has a horseshoe shape opened dorsally. Thus, pressure values in the urethra depend on which point in its circumference the pressure is measured. In our study, using three-dimensional urethral profilometry, we detected differences in the pressure values of as much as 50% [28]. Routinely used catheters, with only one channel serving to measure intraurethral pressure, will be a source of classic method limitation. The construction of the catheter (only one channel for urethral pressure, and a lack of marks on the catheter) led to significant bias in subsequent

examinations. Placing the catheter with a urethral pressure channel difference of as little as fifteen degrees in comparison to the previous attempt yields a completely different examinaton result in the same patient.

The patient's reaction during the examination is another source of potential deviations. Urethral profilometry, according to ICS guidelines [27], should be subsequently repeated two or three times. However, one must take into account that pelvic floor muscles keep reacting to any intervention, which leads to pressure changes. Similarly, when retesting patients at longer time intervals, differences are also detected [29].

Urethral profilometry potentially has a lot of limitations. But is it really worthless enough to be completely discarded from our diagnostic portfolio?

Urethral profilometry clinical value

In correlation with anamnesis, patient's symptoms and the question of urodynamics, urethral profilometry can be a valuable supplement to our diagnostic process. It is crucial to correctly choose the patient or clinical situations in which it can be useful. For example, in SUI, it is not valuable, as it can rarely change the diagnosis or treatment pattern. In SUI, the key urodynamics parameters are Valsalva, cough leak point pressures (VLPP / CLPP) and post-void residual. For suburethral sling implantation, the length of the urethra can be easily and non-invasively assessed by sonography. In overactive bladder (OAB), unless it is secondary to bladder outlet obstruction, the intraurethral pressure measurement is of no significance for implementing the therapy either. Therefore, for this vast number of patients with the most common LUTS, profilometry, apart from its reproducibility, is really neither needed nor useful. However, we must remember that there is a range of symptoms related to impaired urethral function.

In 2% of patients with SUI, urethral instability is the only, and in about 12%, a coexisting cause of urinary incontinence, and it can be present in as many as 56% of patients with OAB syndrome [27,30]. Urethral instability is defined as a drop in intraurethral pressure of 15 to 25 cm H20 or 1/3 of the maximum value and clinically manifested by leakage of urine without a feeling of urgency.

In 70 to 80% of patients with pelvic pain syndrome, a component of pelvic floor hyperactivity is present. In 17% of patients with voiding dysfunction, the underlying cause is poor sphincter relaxation, and in 42%, bladder outlet obstruction (BOO) [31]. Functional BOO, which is either hyperactivity, dyssynergia, or poor relaxation, is one of the main reasons for dysfunctional voiding and secondary bladder overactivity in women without pelvic organ prolapse. It can be successfully treated with

botulinum injections [32]. This can be perfectly diagnosed with urethral profilometry.

The above examples are clinical situations where urethral profilometry is an essential part of the diagnostic pattern, vital for implementing causal treatment.

Discussion

Lower urinary tract symptoms concern about 60% of women worldwide. [33]. Almost 30% of the symptoms concern the voiding phase, which is possibly connected to impaired urethral function. The symptoms' characteristics and intensity change with age, parity, body mass, and other factors. However, a vast number of women are affected by these troublesome symptoms, lowering their quality of life, self-esteem, social, professional, and family life. Moreover, the average time from first symptoms to correct diagnosis is 7 to 9 years. During this time, patients suffer the symptoms of withdrawing from different aspects of life and everyday activities. This difficult situation is exacerbated by difficulty in communication. Only about 25% of women report their urogynaecological complaints to their doctor [34]. On the other hand, only 4% to 16% of primary care doctors actively discuss the issue of pelvic floor symptoms [35]. Furthermore, more than 60% of specialists are not able to interpret the results of a urodynamic examination, 43% do not even perform urethral profilometry, and only 9% do so.

The result of the main profilometric parameter – MUCP – affects the decision on the technique used to operate on a patient with urinary incontinence. Thus, not using this valuable diagnostic tool in clinical practice seems to worsen the therapeutic approach in patients undergoing surgical treatment [36].

There are a few sources of uncertainty surrounding urethral profilometry. They result from both the anatomy and function of structures under examination as well as from the examination technique itself. Patient factors should be taken into account when interpreting the examination. The whole clinical picture should be interpreted when making therapeutic decisions. One must remember that additional tests are only a part of the case and serve to help the clinician confirm or exclude particular pathologies and decide what therapeutic method to use. The technique can be improved by using multichannel catheters and special sensitive software and by standardizing the examination technique. One cannot forget about the limitations on the therapist's side – the inability to either perform correctly and to interpret and exploit the data obtained from the examination underlies the depreciation of a given diagnostic method.

Conclusions

To summarize, the authors would like to emphasize that urethral profilometry, despite its limitations, is a valuable diagnostic tool. Correct patient selection, awareness of the data that can be obtained, and the ability to use them in clinical practice, as well as correct technical execution, are essential factors influencing the perception of the method and its clinical use. Developing new options, such as multichannel profilometry, is a way to improve its clinical value. Creating and adhering to a precise standard of examination will improve the repeatability and quality of data obtained. Thus, urethral profilometry should retain its established position in the portfolio of urogynaecological diagnostic tools.

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MEDICINE
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MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-004
Received: 2023-08-30
Accepted: 2023-11-19

CASE REPORT

Giant hepatic hemangioma with Kasabach-Merritt syndrome treated with right hepatectomy: a case report with literature review

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Abstract

Background: We present a case of giant hepatic hemangioma with Kasabach-Merritt syndrome.
Material and methods: A thirty-seven-year-old female presented to us with a six-month history of recurrent abdominal pain and weight loss. A CT scan was suggestive of a huge right liver mass involving the entire right lobe, which was indicative of hemangioma. Her blood chemistry showed a platelet count of 68,000 and INR of 1.4, suggestive of Kasabach-Merritt syndrome.
Results: In view of the size of the mass, symptoms and associated Kasabach-Merritt syndrome, the patient was offered surgical removal of the tumour. On exploration, the tumour covered the right lobe completely and so a right hepatectomy was performed. The hemangioma was 25 cm × 20 cm × 16 cm and weighed 1.8 kg. The postoperative course of the patient was uneventful. On day 3, the platelet count had improved to 98,000 and the INR had improved to 1.2. The patient was discharged on day five.
Conclusions: A right hepatectomy for a giant hemangioma of the liver is a safe procedure and can be curative for associated Kasabach-Merritt syndrome.
Keywords: Giant hemangioma, liver tumours, right hepatectomy

Introduction

Hepatic hemangiomas are the most common benign liver tumours with prevalence ranging from 1% to 20% and seen predominantly in women. In adults, hemangiomas are usually found in patients at a mean age of 50 years and equally in the left and right lobes of the liver. Most hemangiomas are small in size and do not cause any symptoms and therefore do not require any treatment [1–4]. Small hemangiomas are usually less than 3 cm in size and medium hemangiomas are usually between 3 cm to 10 cm in size. Hemangiomas measuring more than 10 cm are known as giant hepatic hemangiomas. Hepatic hemangiomas are usually discovered accidently, or they cause symptoms. Most of them have typical radiologic features.

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Giant hepatic hemangiomas usually present with symptoms. Kasabach-Merritt syndrome consists of a giant hepatic hemangioma with coagulopathy and thrombocytopenia [5]. Patients with a giant hepatic hemangioma usually require surgery for the symptoms. The symptoms resolve soon after surgery. In most cases Kasabach-Merritt syndrome also resolves after surgery.

We report the case of a giant liver hemangioma of 25 cm and 1.8 kg in weight presenting with symptoms such as abdominal pain, weight loss and associated Kasabach-Merritt syndrome.

Case report

A 37-year-old female presented to us with a six-month history of recurrent abdominal pain and weight loss. On examination, a large hypochondrial mass, which moved on respiration and suggested a liver mass, was discovered. Ultrasound showed a large right hepatic mass. A CT scan found a huge right liver mass involving the entire right lobe, with peripheral nodular enhancement and progressive centripetal fill-in, suggestive of hemangioma, while the rest of the liver was non cirrhotic with a normal spleen and no signs suggestive of portal hypertension. Her blood chemistry showed a platelet count of 68,000 and INR of 1.4, indicative of Kasabach-Merritt syndrome.

In view of the size of the mass, symptoms and associated Kasabach-Merritt syndrome, the patient was offered surgical removal of the tumour. On exploration, the tumour entirely covered the right lobe, so the decision to perform a right hepatectomy was taken. The liver was mobilized and a portal dissection was performed. The right hepatic artery, right portal vein and right bile duct were dissected and looped. The right hepatic artery and right portal vein were clamped, and the transection line was marked. The liver was transected under selective occlusion of the right portal vein and the right hepatic artery.

The right hepatic artery, right portal vein and right bile duct were doubly ligated and divided. The right hepatic vein was divided intrahepatically and the specimen was retrieved. The hemangioma was of 25 cm × 20 cm × 16 cm and weighed 1.8 kg. The histopathology confirmed a giant hemangioma.

The postoperative course of the patient was uneventful. On day 3 the platelet count was improved to 98,000 and the INR improved to 1.2. The patient was discharged on day five. There was not morbidity.

Discussion

Hepatic hemangiomas are congenital vascular malformations and the most common benign liver tumours [5]. They are most commonly seen in females in their fifth to sixth decade [1–4].

They are usually solitary tumours, but multiple tumours can also be seen. Malignant transformation is usually not seen.

The etiology of hepatic hemangioma is not clear, but most researchers suggest that they are congenital in origin and that patients have a genetic predisposition [5].

Hepatic hemangiomas are usually detected from imaging performed for other reasons or for vague abdominal symptoms. On ultrasound, hepatic hemangiomas appear as a hyper echoic nodule with a regular margin with posterior acoustic enhancement. On CT scans, they are seen as a hypodense, well-defined lesion, which after contrast injection shows peripheral nodular enhancement with progressive centripetal homogeneous filling. On MRI, the typical appearance is a well-demarcated, homogenous lesion, hypointense in T1-weighted images and hyperintense in T2-weighted images [5].

Giant hemangiomas may be asymptomatic or can present with abdominal pain and weight loss, as in our case. On rare occasions they attain a very large size of about 20 to 40 cm. Left lobe hemangiomas can present with pressure symptoms on adjacent organs, such as vomiting, anorexia and jaundice. In giant hemangiomas the symptoms are largely due to inflammation, or due to the consumptive coagulopathy of Kasabach-Merritt syndrome and compression of the adjacent organs [6].

Spontaneous rupture of hemangioma and hemoperitoneum is another potential complication which can be life-threatening.

Kasabach-Merritt syndrome includes Giant Hepatic hemangioma, thrombocytopenia, and coagulopathy [7]. This coagulopathy consists of intravascular coagulation, clotting, and fibrinolysis within the hemangioma, which was seen in our case. It can lead to spontaneous bleeding and rupture of the hemangioma, which can be life-threatening. Kasabach-Merritt syndrome usually disappears after removal of the hemangioma [8], which was also seen in the case under discussion and was suggested by improvement in the thrombocytopenia and prothrombin time and the international normalized ratio on post operative day four.

Whatever the size, there is no treatment for asymptomatic hemangioma. Indications for treatment include severe symptoms, complications, and inability to exclude malignancy [9,10].

Surgical resections remain the definitive treatment in symptomatic giant hemangioma with Kasabach-Merritt syndrome; other therapies such as hepatic artery ligation and radiation therapy are less effective [11,12].

In giant symptomatic hepatic hemangioma, the treatment usually indicated is surgical resection. Enucleation or formal anatomic resection depends upon the size and location of the tumour as well as technical skills. Peripheral located tumours should be enucleated and large tumours and deeply located tumours should be removed by formal anatomic resection, as was performed in the case reported here [13–17]. Right and Left hepatectomy should be performed whenever the hemangioma involves an entire lobe, as in the present case. Liver transplantation has also been used successfully to treat symptomatic patients with a technically unresectable, complicated giant hemangioma [17].

In conclusion right hepatectomy for a giant hemangioma of the liver is a safe procedure and can be curative for associated Kasabach-Merritt syndrome.

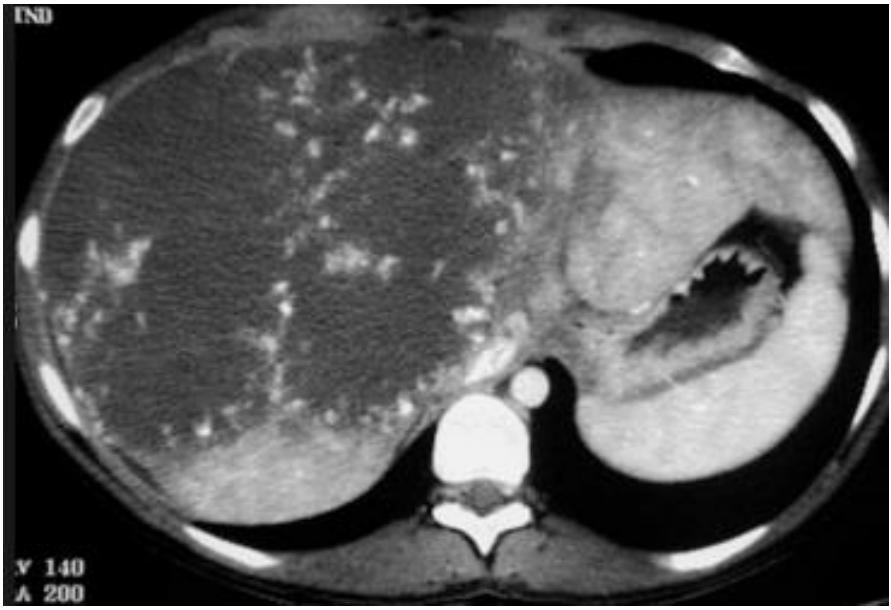

Figure 1. CT scan showing right liver hemangioma

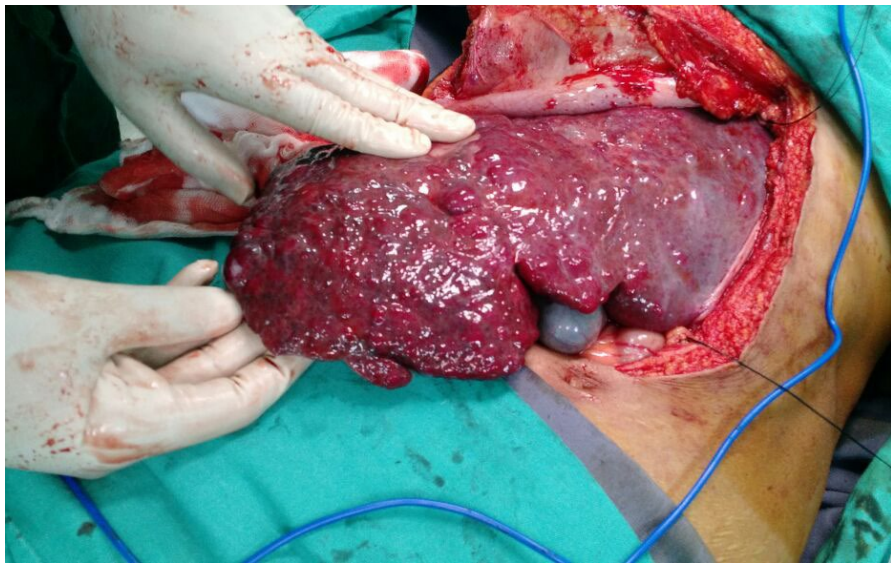

Figure 2. Intraoperative picture (Photo by Vasavada)

Figure 3. Specimen (Photo by Vasavada)

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MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-005
Received: 2023-09-12
Accepted: 2023-11-19

COMMENTARY

The role of lymphadenctomy in the treatment of gastric cancer

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Abstract

In this commentary the author discusses the current status and clinical importance of lymphadenectomy performed for the treatment of gastric cancer.
Keywords: gastric cancer, lymphadenectomy, surgery, quality control

Introduction

The debate concerning the extent of lymphadenectomy during gastric cancer surgery has been going on for some 30 years [1]. The definitions of D1, D2 and D3 have evolved together with the indications for each one of them. Over time, the data have gradually confirmed one thing: the more extensive the lymphadenectomy, the better for gastric cancer patients. Current TNM requires 16 nodes to be resected, and a study by Woo et al. suggests that 29 or more translates into better survival [2]. In a recent paper Desiderio et al. define "optimal lymphadenectomy" as retrieval of 30 nodes or more [3]. In fact, at gastric cancer centres of excellence the median number of nodes retrieved can be as high as 35 [4], which is indeed reassuring. Unfortunately, the reality – as shown by Desiderio et al. – is much less optimistic. Almost 50% of patients operated on in the USA underwent inadequate lymphadenectomy (less than 16 nodes), while lymphadenectomy was optimal for only 15%. Let us not underestimate this data: every second patient underwent an operation that was not optimal according to current standards of treatment. Not surprisingly, suboptimal lymphadenectomy reduced the chances of survival. How was such a disastrous quality of surgery possible in a country famous for rigorous surgical training? An intuitive explanation would be that surgeons are required to define their lymphadenectomy as D1, D2 or D2+, but rarely

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is this subsequently compared to the number of excised nodes. It is fairly easy to call an operation D2+. However, if this operation yields less than 16 nodes, something is definitely wrong. Either the surgeon is being economical with the truth or s/he does not understand what D2+ means [5]. Data falsification is a serious problem and not easy for the medical and surgical community to deal with. It is difficult to detect, difficult to prove and the consequences for those who are guilty of it are quite limited [6].

However, if the problem only lies in the surgical technique – and this seems to be the most likely explanation for these findings – it should clearly be much easier to correct. Understanding the technical aspects of adequate lymphadenectomy is simply a matter of training. The data point out that this training might be suboptimal. So maybe it is time to admit that western training in gastric lymphadenectomy is inferior to what we know from the Asian surgical community, and we have to work hard to close this gap.

Desiderio et al. are optimistic, stating that in the last study period the percentage of patients undergoing optimal lymphadenectomy rose from 15% to 30%. We can agree that this is a good sign, but for 70% of American patients, lymphadenectomy is still less than adequate. We are spending millions of dollars on the development of new chemotherapeutic agents, and yet we have a way to improve the survival rate of gastric cancer patients considerably, simply by performing better quality surgery. Perhaps the time has come to spend a fraction of those millions on better training and quality control of lymphadenectomy for gastric cancer.

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MEDICINE
& PUBLIC
HEALTH

MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-006
Received: 2023-10-25
Accepted: 2023-11-21

CASE REPORT

Acute small bowel obstruction due to Quain hernia (caused by defect of broad ligament), diagnostic and treatment challenge

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Abstract

Background: Acute small bowel obstruction due to internal hernia is a rare condition. One of the most rare encounters is the Quain hernia (caused by broad ligament defect).
Material and methods: A rare case of internal Quain hernia due to a broad ligament defect that caused an acute small intestine obstruction is described.
Results: The challenge of diagnosis and the treatment choice is briefly discussed.
Conclusions: Patients with broad ligament defect could be clinically very chellenging with not effective RX for the early diagnosis. CT scan with intravenous contrast enhancement could be useful for diagnosis and CT radiologic sign of deviation of the "healthy" uterus to the left or to the right side could be considered like an indirect CT sign of Quain internal hernia. More clinical case studies of treatment options are necessary for further evaluations.
Keywords: acute small bowel obstruction, internal hernia, broad ligament defect, surgery

Introduction

An acute small intestine obstruction due to internal hernia is a rare condition that occurs in around 0.6% to 6% of all small bowel obstructions [1]. Several rare types of hernia exist, including small bowel and epiploon, such as the Amyand, DeGarengeot and Littre types of hernia [2]. One of the rarest cases is that described in 1861 by Quain, discovered via autopsy, which was a case of hernia through the broad ligament. In 1934, Hunt classified three types of hernia through the broad ligament for the first time [1,3–6]. In 1986, an anatomical classification of broad ligament defects was proposed by Cilley et al. Type 1 defects occur caudal to the round ligament of the uterus, type 2 defects occur above the round ligament, while type 3 defects

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occur between the round ligament and the remainder of the broad ligament, through the meso-ligamentum teres [3]. These cases of Quain hernia were manifested clinically with an acute small intestine obstruction [1,4].

Case description

Patient Presentation

We present the clinical case of a 52-year-old patient with an intestinal obstruction resulting from passage of part of the small intestine through a fenestration in the broad ligament of the uterus repaired by laparoscopic suturing with recurrence one year after surgery.

Before the first surgery, this was a clinical case of a 52-year-old female patient with no history of previous surgery, with abdominal pain history over eight years with multiple visits to the emergency care unit, family doctor and gastroenterologist, who never performed a colonoscopy or gastroscopy. Previous X-rays of the abdomen had not shown specific signs.

Diagnostic Workup

During evaluation at the emergency room, the patient presented typical symptoms of an acute small bowel obstruction with abdominal pain, nausea, vomiting more than ten times (food and after bile), pale and cold skin, warmer abdomen skin, meteorism, but no acute abdomen symptoms (Blumberg negative).

An X-ray of the abdomen showed moderate meteorically widened loops of the small intestine in the left middle and lower abdomen. There were no air fluid levels and there was no evidence of pneumoperitoneum. Blood tests showed a mild increase in inflammation indices (white blood cells, neutrophils, lactates).

A Computed Tomography (CT) scan showed dilation and distension of the intestinal loops, mainly ileal with multiple pathological hydroaeric levels, mostly in the central-abdominal area and in the lower abdomen, where a difference in the caliber of the loop in the left iliac fossa, specifically in the paramedian region, raised a suspicion of ileal volvulus. The appearance of the mesenteric venous vessels and some millimeter lymph nodes of the mesenterial root was congested. A small amount of free fluid was noted in the pelvis. Deviation of the uterus to the right-hand side was evident, which could suggest the presence of an internal hernia. CT conclusion: ileal volvulus, internal hernia, minimal free fluid at pelvis (Fig. 1) [7,8].

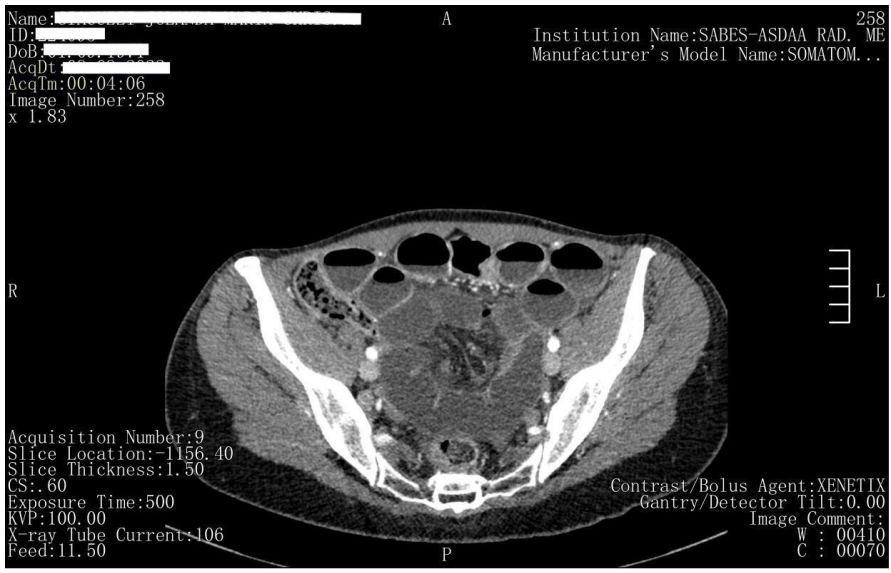

Figure 1. CT scan of the patient with an acute small intestine obstruction due to an internal hernia caused by broad ligament defect

Management

The patient recovered at the Surgical Department, received diagnostic laparoscopy, which clearly showed an internal hernia through a broad ligament defect with the small intestine still viable, which was preserved and the broad ligament defect was successfully repaired with laparoscopic non-absorbable surgical suturing (Fig. 2). The patient's position was supine, and the first optical trocar was inserted using an open technique, placed supraumbilically with a 10 mm diameter, while the other two work trocars (5 mm) were placed in the standard manner as for a left ovariectomy. There are two main concepts of broad ligament repair that have already been described and published: laparoscopic suture repair of the defect or salpingo-oophorectomy [9,10]. The decision was made to preserve the ovary and perform laparoscopic suturing with non-absorbable surgical suturing. The patient was successfully discharged from the hospital on the fourth postoperative day in good local and general health.

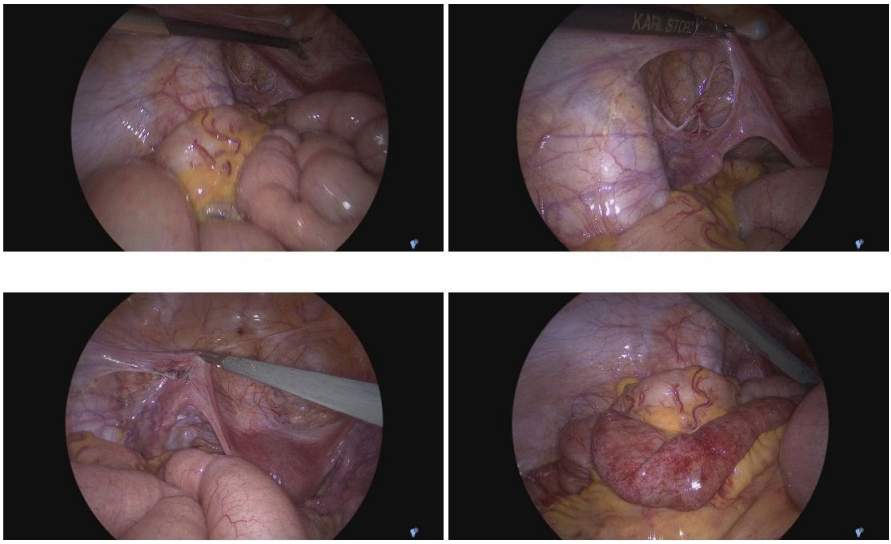

Figure 2. Laparoscopic diagnostic and laparoscopic broad ligament repair (suturing with non-absorbable surgical suture) for an acute small intestine obstruction caused by Quain internal hernia (photo by Shabat)

Follow up

Over one year the patient felt totally well and never came to the emergency department or gastroenterologist.

Management of recurrence

One year after laparoscopic suturing of the broad ligament defect the patient came back to the emergency room with clinical symptoms of an acute small bowel obstruction and acute abdomen. An X-ray of the abdomen confirmed a small intestine obstruction. A CT scan showed necrosis of the loop of the small intestine due to an internal hernia.

During laparotomy, 25 cm of small bowel was resected due to intestinal ischemic necrosis caused by a recurrent hernia in the remnant of the broad ligament. The patient was successfully discharged from the hospital on the seventh postoperative day in good local and general health.

Conclusion

Over a number of years patients with broad ligament defects could have clinical symptoms similar to irritable bowel disease.

An X-ray may not be useful for early precise diagnosis, but could be useful only in the case of evidence of a small intestine obstruction with air-fluid levels in the intestinal loops.

A CT scan with intravenous contrast enhancement could evidence radiological signs of deviation of the "healthy" uterus to the left or to the right side. This radiological sign could be important for the diagnosis of an internal hernia through broad ligament defect and could be considered an indirect CT sign of Quain internal hernia.

Laparoscopic suturing or resection should be evaluated as a treatment option and the best way forward needs to be discussed. More clinical case studies are necessary for further evaluations.

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MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-007
Received: 2023-10-21
Accepted: 2023-11-19

CASE REPORT

Medial femoral condyle fracture as a complication of the arthroscopic microfracture technique

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Abstract

We present a case of a rare complication of microfracture technique used during arthroscopy repair of the knee joint.
Keywords: knee joint, cartilage repair, microfracture

Introduction

Knee microfracture is a procedure used to promote cartilage repair in the knee joint. Among the main complications of the procedure performed during arthroscopy are cartilage breakdown over time and degeneration of the cartilage, resulting in increased stiffness of the joint [1]. The results of the microfracture technique are very encouraging with a complete filling of the defect after twelve months confirmed in 60% of patients [2]. The failure rate of this technique is consistently below 20% [3]. A rare complication of the microfracture is a fracture of the medial femoral condyle during arthroscopy.

Case presentation

During arthroscopy of a 29-year-old patient, apart from damage to the meniscus and anterior cruciate ligament, a 3 × 4 mm articular cartilage defect was found in the medial condyle of the thigh. This damage qualified for a microfracture procedure due to a small amount of deep damage to the articular cartilage. The remaining part of the cartilage showed grade II/III chondromalacia: free cartilage fragments were removed and the joint was rinsed. After preparing the defect and levelling the articular cartilage at the edges of the defect with appropriate chisels at a 90-degree

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angle to the subchondral layer, a microfracture was made (Fig. 1). Most likely, due to the use of too much force, the cartilage and bone tissue ruptured, as seen in the arthroscopy photo (Fig. 2). The treatment was evacuation of the unstable cartilage elements and flushing of the joint (Fig. 1). The patient was treated conservatively by resting the limb that had been operated on for twelve weeks. Rehabilitation began on the third day following the procedure. During the first three weeks, exercises were performed in the orthosis without movements in the operated joint: isometric exercises and physical therapy. After three weeks, knee joint exercises on a CPM splint were started, achieving the correct range of motion at the end of the sixth week. After six weeks, active movements were started. After twelve weeks, the patient began to walk with full weight on the limb concerned with a full range of motion. The patient did not report any problems during rehabilitation. No joint swelling was noted during follow-up visits. On follow-up arthroscopy the filling of the fracture and of the cartilage defect was complete (Fig. 3). The functional result was very good with the patient undergoing further reconstruction of the crucial ligaments of the knee and reaching full functional recovery.

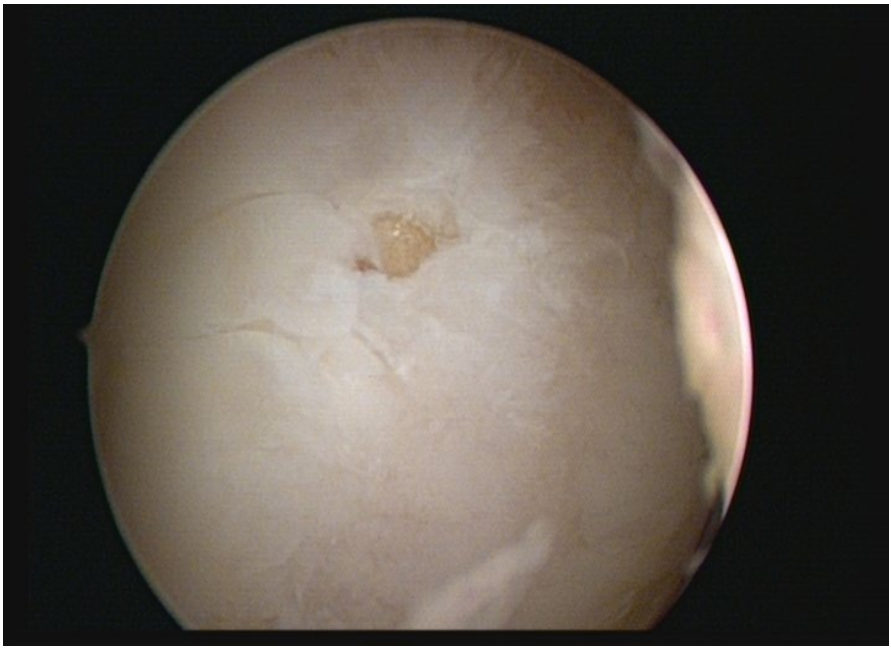

Figure 1. Evacuation of the unstable cartilage elements. Photo by Jarosław Kolendo.

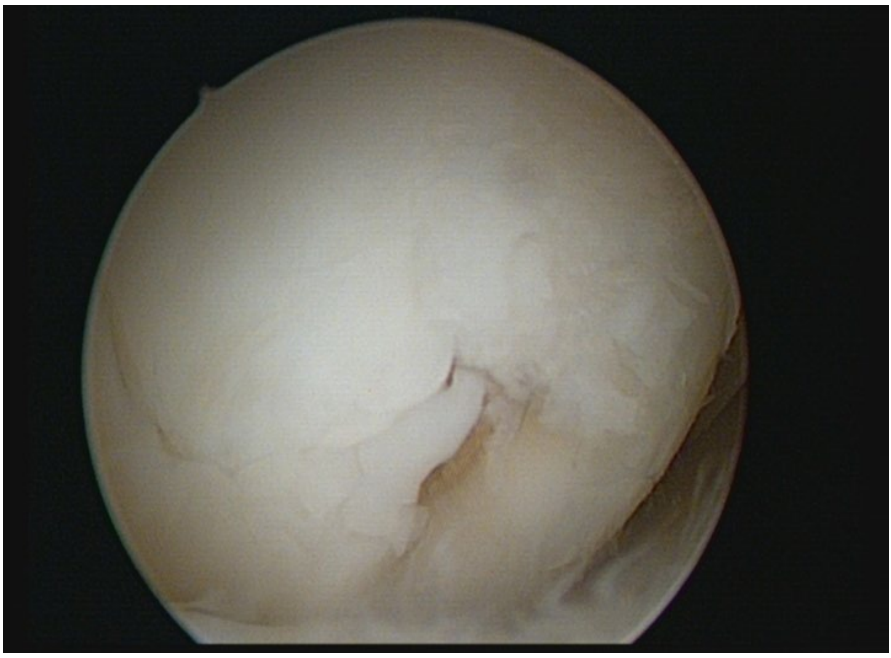

Figure 2. Ruptered cartilage and bone tissue. Photo by Jarosław Kolendo.

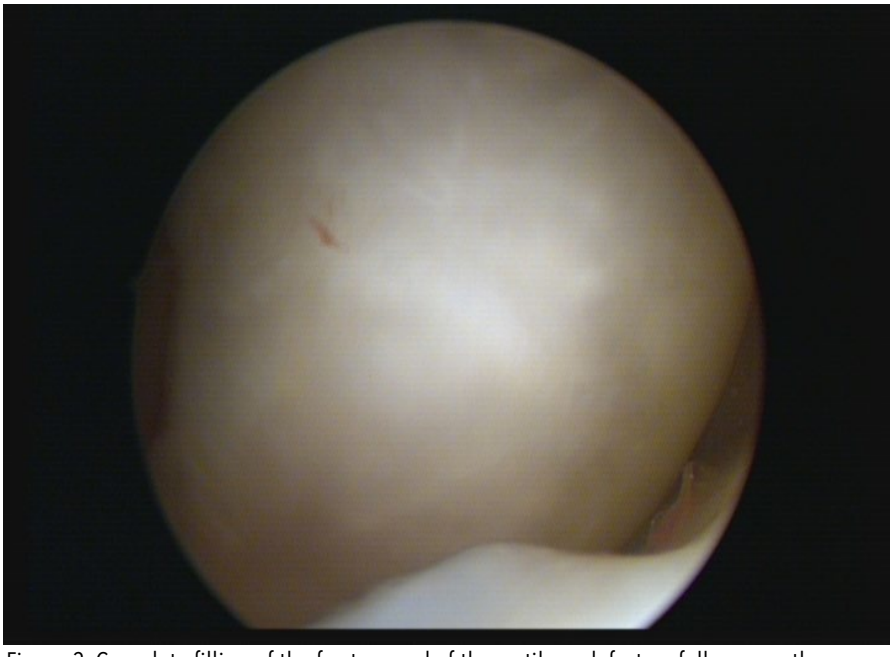

Figure 3. Complete filling of the fracture and of the cartilage defect on follow-up arthroscopy. Photo by Jarosław Kolendo.

Conclusion

A nondisplaced fracture of the condyle is a rare complication of the microfracture technique, but when it occurs it can be successfully managed with conservative treatment.

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MEDICINE & PUBLIC HEALTH
e-ISSN 2956-9443

2023, Vol. I, No. 2
DOI: 10.48269/MandPH-AFMKU-23-2-008
Received: 2023-01-31
Accepted: 2023-11-21

CASE REPORT

Mucous tumour of the appendix

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Abstract

Background: In this paper we present a case of perforated mucinous neoplasm of the appendix. Diagnosis and treatment of this rare condition are briefly discussed.
Material and methods: A 42-year-old patient admitted to the General Surgery Clinic for elective surgery of left-sided inguinal hernia. In the postoperative period, severe pain in the lower abdomen persisted – qualified for laparotomy, during which an appendix tumor and a large amount of gelatinous bloody contents in the right lower abdomen were found. The appendix was removed and the peritoneal cavity was cleaned in the content. Histopathological examination revealed low grade appendiceal mucinous neoplasm (LAMN) pT4a NX M1b. No angiovasia or nerve trunk infiltration were found. At the top of the appendix a perforation with mucus around was noted. Postoperative course was uncomplicated. The patient was referred to a peritoneal carcinomatosis center where a right hemicolectomy with HIPEC therapy was performed.
Results: Mucous neoplasms of the appendix of low grade (LAMN) are rare tumors.
Conclusions: Mucous neoplasms of the appendix of low grade (LAMN) are rare tumors. The treatment of choice is surgical excision. The most serious complication of LAMN is a rupture with the escape of mucus into the peritoneal cavity.
Keywords: myxoma, pseudomyxoma peritonei, appendix, tumours

Introduction

Appendicitis tumours are rare. They are present in approximately 0.2%–0.3% of cases of appendicitis and 8%–10% of appendix tumours [1,2]. Low-grade appendix mucous tumour (LAMN) is a rare tumour that causes bulbous appendix enlargement due to the secretion of a large amount of gelatinous mucus [3]. This tumour is a rare occurrence found in 0.3% of appendicitis sections [4,5]. The average age at diagnosis of the disease is 70 years and it is more common in women [6]. The symptoms of LAMN are often atypical, discovered accidentally during other tests [7]. An extremely

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rare complication of LAMN may be the formation of pseudoperitoneal myxoma, a malignant tumour that is difficult to treat and fills the abdominal cavity with gelatinous contents [8].

Material and Methods

A 42-year-old patient was admitted to the General Surgery Clinic for elective surgery on a left-sided inguinal hernia. In the postoperative period, severe pain in the lower abdomen persisted, so he was qualified for a laparotomy, during which an appendix tumour and a large amount of bloody gelatinous contents in the right lower abdomen were found. The appendix was removed and the peritoneal cavity was cleaned of the contents. A histopathological examination revealed a low-grade appendiceal mucinous neoplasm (LAMN) pT4a NX M1b. No angiovasia or nerve trunk infiltration was found. At the top of the appendix a perforation with surrounding mucus was noted. The decision to perform a laparotomy was based on clinical signs of acute abdomen. No CT or ultrasound was performed before surgery due to an open laparotomy procedure with resection except for the healthy margin. The postoperative period was good. He did not report abdominal pain and other gastrointestinal disorders. On inspection visits his condition was good. The abdomen was soft and painless. The rhythm of bowel movements was within the normal range. The patient followed the surgical recommendations. The final effect of the surgical treatment was positive. The patient was referred to a peritoneal carcinomatosis centre where a right hemicolectomy with HIPEC therapy was performed. No peritoneal implants were noted.

Discussion

Appendicitis tumours are rare. They occur most often in the form of myxoma. They can arise as a simple cyst that forms while the lumen of the appendix is obstructed, accompanied by normal mucus production – gallstone, faecal stone, endometriosis, torsion of the appendix, intestinal tumour and even postoperative adhesion [9,10]. In the case of excessive mucous hyperplasia without the features of atypia, the lesions do not usually exceed 2 cm in diameter and rarely threaten to rupture. Mucinous cystadenoma (benign hyperplastic lesion) and adenocarcinoma mucosacus (malignant tumour) with features of advanced or moderate dysplasia may be symptomatic and perforated. They usually reach a size of about 6 cm to 25 cm [9,11–13]. They can be misdiagnosed as retroperitoneal tumours or right adnexa [7,14]. In most cases, they are detected accidentally, during other examinations within the abdominal cavity. Ultrasound and computed tomography can clearly show the size of the appendix tumour, inspection, the amount of mucus in

the lumen and anatomical relationships [15]. Computed tomography is more sensitive than ultrasound in evaluating tumours and detecting parietal calcifications, suggesting a diagnosis but only revealed in 50% of cases [16]. Surgical resection of low-grade appendicitis mucosal neoplasms is recommended [17]. The most important point in dealing with LAMN is to avoid rupture. Mucin, which fills the abdominal cavity, can lead to pseudomyxoma peritonei, a rare malignant tumour, characterized by the accumulation of a large amount of mucus in the peritoneal cavity. Although low-grade appendix mucosa is a slow-growing tumour, both LAMN and mucosal adenocarcinoma may progress to peritoneal myxoma [6,7]. In addition to the increase in CRP levels, elevated levels of markers (CEA, CA19-9) can be observed, suggesting hyperplastic etiology or the presence of concomitant changes [12,18]. The five-year prognosis for patients with a malignant appendix tumour complicated by pseudomyxoma peritonei is only 53% [19]. For benign lesions, the five-year survival rate is 100% [12,20]. Treatment of pseudomyxoma peritonei is difficult and currently relies on the HIPEC technique combined with peritonectomy [21]. HIPEC (Hyperthermic Intraperitoneal Chemotherapy) provides hyperthermia induction and direct intra-abdominal administration of chemotherapy in addition to intracellular drug secretion. It is used in patients with cancer dissemination to the peritoneal cavities, e.g. gastric cancer, cancer of the appendix, cancer of the colon, mesothelioma [22].

Results

Low-grade mucous neoplasms of the appendix (LAMN) are rare tumours.

Conclusion

Low-grade mucous neoplasms of the appendix (LAMN) are rare tumours. The treatment of choice is surgical excision. The most serious complication of LAMN is a rupture with the escape of mucus into the peritoneal cavity.

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