

ŻYDEK, Ada, CIULEK, Urszula, BILSKA, Wiktoria, ZDUŃCZYK, Wiktoria, DOBOSZ, Anna, DUBIŃSKA, Michalina and PADUCH-JAKUBCZYK, Wiktoria. Early diagnosis, effective treatment: modern approaches to the management of ectopic pregnancies. *Quality in Sport*. 2024;22:55072. eISSN 2450-3118.

<https://dx.doi.org/10.12775/QS.2024.22.55072>

<https://apcz.umk.pl/QS/article/view/55072>

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

© The Authors 2024;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland

Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 10.09.2024. Revised: 19.09.2024. Accepted: 20.09.2024. Published: 23.09.2024.

Early diagnosis, effective treatment: modern approaches to the management of ectopic pregnancies

Urszula Ciulek

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

urszula.ciulek@wp.pl

<https://orcid.org/0009-0007-8536-2906>

Wiktoria Bilska

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

bilskawiktoria97@gmail.com

<https://orcid.org/0009-0001-6029-4210>

Ada Żydek

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

ada7613@gmail.com

<https://orcid.org/0009-0009-1212-643X>

Wiktoria Zduńczyk

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

wiktoria.zdunczyk3@gmail.com

<https://orcid.org/0009-0005-1822-7777>

Anna Dobosz

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

4dobosz.anna4@gmail.com

<https://orcid.org/0009-0006-3464-7680>

Michalina Dubińska

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

dubinska.michalina@gmail.com

<https://orcid.org/0009-0006-8130-7451>

Wiktoria Paduch-Jakubczyk

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

paduchwiktoria@wp.pl

<https://orcid.org/0009-0008-3226-9430>

Abstract

Purpose of research: The aim of this article is to provide an overview of the diagnosis and management of atypical ectopic pregnancy, with particular reference to pregnancy in the cesarean scar. The importance of early detection and medical intervention will be described, as well as the impact of advanced diagnostic techniques and modern treatments on the curability of patients. This article aims to provide valuable insights into the development of effective strategies for the diagnosis, treatment and prognosis of ectopic pregnancy.

State of knowledge: Ectopic pregnancies account for 1-2% of all pregnancies, with the majority (90%) occurring in the fallopian tube. Less commonly, they present as ovarian, cervical or abdominal pregnancies. Advances in diagnosis and treatment have made it possible to identify rare forms such as cesarean scar pregnancy (0.15% of all pregnancies), interstitial pregnancy and recurrent ectopic pregnancy on tubal remnants. Techniques such as transvaginal ultrasound (TVS), MRI and laparoscopy have the potential to improve diagnostic accuracy and treatment outcomes. Modern interventions such as transvaginal natural orifice transluminal endoscopic surgery (vNOTES) and methotrexate have shown promise in terms of safety and efficacy.

Conclusions: Ectopic pregnancy and its complications have a significant impact on the psycho-physical health of patients, requiring ongoing research to improve diagnostic and therapeutic methods. Future studies should focus on long-term outcomes and the coordination of multidisciplinary medical care to further improve diagnosis and treatment.

Keywords: ectopic pregnancy, ectopic pregnancy diagnosis, ectopic pregnancy treatment, Cesarean scar pregnancy, Interstitial pregnancy, Recurrent ectopic pregnancy

Introduction

Ectopic pregnancy is a condition in which a fertilized egg implants outside the membrane that lines the uterine cavity. It is estimated that this accounts for between 1 and 2% of all pregnancies [6]. In the majority of cases (90%), the pregnancy is localized in the ampulla of the fallopian tube. In less frequent instances, it may manifest in the form of an ovarian, cervical or abdominal pregnancy [17].

As diagnostic techniques have developed, it has become increasingly common to diagnose unusual locations of pregnancy as ectopic. These include caesarean scar pregnancy (CSP), which accounts for 0.15 per cent of all pregnancies, interstitial pregnancy and recurrent ectopic pregnancy in the remnants of the fallopian tube. It is important to be aware that an undetected and undertreated early ectopic pregnancy can pose a significant threat to the health and life of older women of reproductive age. However, despite the progress that has been made in diagnosis, the challenge of detecting it early remains.

Cesarean scar pregnancy

Due to the increasing percentage of cesarean section deliveries performed worldwide, the incidence of one type of ectopic pregnancy, the post-caesarean section membrane pregnancy, is increasing. At the moment, the incidence of this type of pregnancy is about 1 in 2,000 pregnancies, while the number is increasing quite rapidly [12].

An ectopic pregnancy is a potentially life-threatening condition for the patient because it can cause the uterus to rupture and hemorrhage, among other complications. This is why early diagnosis and prompt implementation of treatment is so important [9][10]. In standard diagnostics, a transvaginal ultrasound (TVS) is typically used to diagnose a cesarean scar pregnancy [17]. However, in more complicated cases, magnetic resonance imaging (MRI) may be employed as an additional diagnostic tool. A variety of treatment options are available, including pharmacological and surgical methods (including minimally invasive techniques such as vNOTES) [5][11]. It is thought that CSP may predispose to difficult healing of the scar after a cesarean section, potentially creating space for embryo implantation.

Interstitial pregnancy

Interstitial pregnancy is a very rare type of ectopic pregnancy. This occurs when the gestational sac nests in the myometrium. To the best of our knowledge, there have been fewer than 100 cases reported to date [15][16]. Interstitial pregnancy is localized in the upper part of the uterus, which poses a major diagnostic and therapeutic challenge. Diagnosis starts with TVS, while more complicated cases of this pregnancy are diagnosed with MRI [3][16]. Compared to other types of ectopic pregnancies, diagnosis often takes longer, which contributes to an increased risk of complications. Due to the high risk of complications, such as pregnancy rupture and hemorrhage, surgical treatment is recommended. However, another option is methotrexate therapy, which is sufficient in some cases [17][20].

Recurrent ectopic pregnancy

The particularly challenging type of ectopic pregnancy that can occur following salpingectomy, is recurrent ectopic pregnancy on tubal remnants. It is associated with a higher risk of mortality compared to other types of ectopic pregnancies [12].

A diagnosis is typically made based on a combination of clinical symptoms, laboratory tests (such as beta-human gonadotropin subunit levels, chorionicity and imaging tests, especially transvaginal ultrasound) [3][4]. It is often the case that a multidisciplinary approach is required for effective treatment. One of the techniques is Endoloop, which involves clamping a loop over the fetal egg and cutting it away from the uterine horn using a harmonic knife [12]. It is a method that uses lower energies than electrocoagulation and allows cutting and coagulation at the same time. Both of these methods are possible, which helps to minimize bleeding from the uterine cavity. This method has been found to be effective and minimally invasive.

It would seem that the increased use of assisted reproductive technology (ART) is leading to an increase in the number of ectopic lesions that are not related to the fallopian tube [6][22]. It is worth noting that while ART is an effective technique for treating infertility, there is an increased risk of the embryo implanting outside the uterine cavity. It would seem that another factor increasing the incidence of ectopic pregnancy is the increasing rate of cesarean sections. The aim of this review is to provide the latest data on less common types of ectopic pregnancy and to facilitate a discussion of the available diagnostic methods and therapeutic options. It would be beneficial to gain a deeper understanding of these less common types of ectopic pregnancy and to identify them more accurately, with a view to improving treatment outcomes and ensuring the safety of patients. A review of the literature highlights the importance of research into safer and more effective treatments so that more precise diagnostic methods can be developed [5][6]. There is a need to raise clinical awareness and educate patients about the atypical types of ectopic pregnancy and how important early detection of such pregnancies is in terms of more effective treatment.

Diagnosis

The diagnosis of unusual forms of ectopic pregnancies, such as cesarean scar pregnancy, interstitial pregnancy, and recurrent ectopic pregnancy on tubal remnants, is based on advanced imaging techniques. The most frequently used method is transvaginal ultrasound (TVS), which has the advantage of allowing for early detection of ectopic pregnancy and the location of the embryo to be determined. TVS is often the preferred test due to its availability, low costs and high sensitivity in detecting pregnancies and ectopic lesions.

In cases where a more complex diagnostic tool is required, magnetic resonance imaging (MRI) may be a useful additional option [16]. This diagnostic method allows very detailed imaging of anatomical structures, which helps to implement an individually tailored therapeutic plan. MRI is very effective and often used in imaging pregnancy in the cesarean section scar. With its help, the location of the embryo and the thickness of the scar can be accurately determined, which is crucial in deciding on therapeutic management.

When an ectopic pregnancy is suspected, close monitoring of human chorionic gonadotropin beta subunit (β hCG) levels is very important. An elevated result, inconsistent with a normal intrauterine pregnancy, together with imaging findings suggestive of a pregnancy occurring outside the uterine cavity, suggest a diagnosis of ectopic pregnancy [20].

Similarly, recurrent ectopic pregnancy on tubal remnants after salpingectomy can be diagnosed in a similar way.

In order to confirm the diagnosis, it would be advisable to monitor β -hCG levels in conjunction with imaging tests such as transvaginal ultrasound and magnetic resonance imaging, which would enable us to locate the embryo. In order to reduce the risk of complications and achieve the most effective treatment outcomes, early detection and accurate diagnosis are important.

Transvaginal ultrasonography (TVS) has high resolution and the ability to image early pregnancy structures and is therefore one of the primary imaging techniques for ectopic pregnancies [20]. It is thought that the high-frequency transducer used in TVS provides detailed images of the pelvic organs, which may allow clinicians to accurately locate the gestational sac and surrounding structures [3]. In cases of CSP, TVS has the potential to facilitate the visualization of the gestational sac in the cesarean section scar, as well as a thin or damaged layer of myometrium in between the gestational sac and bladder. Doppler studies in TVS allow imaging of increased vascularisation around the implantation site.

It can be said that measurement of the concentration of beta-human chorionic gonadotropin (β -hCG) remains the basic diagnostic element in the case of ectopic pregnancies [4]. In the context of intrauterine pregnancies, it is typically observed that β -hCG levels double every 48 hours during the early stages of pregnancy [19]. In ectopic cases, an increase in β -hCG levels is often observed [16]. However, in some instances, the levels may remain stable or even slow, which requires further investigation [13][14]. It is thought that combining β -hCG measurements with imaging results may help to differentiate between ectopic pregnancies and normal intrauterine pregnancies, as well as ectopic pregnancies that have failed. It would be prudent to consider the possibility of an ectopic pregnancy in cases where there is a growing β -hCG concentration, despite the absence of an intrauterine gestational sac on TVS [21].

Treatment

It seems reasonable to suggest that treatment of atypical ectopic pregnancies should be individualized, taking into account the clinical condition of the patient, the location of the pregnancy and its stage. Treatment of ectopic pregnancy in the cesarean section scar (CSP) includes pharmacological and surgical approaches. In cases where patients are hemodynamically stable and wish to preserve fertility, methotrexate (MTX) is used [17]. If pharmacotherapy is ineffective or contraindicated, surgical treatment is used. Minimally invasive endoscopic techniques are available [5]. One of these is transvaginal natural orifice endoscopic surgery (vNOTES). It involves the use of endoscopic instruments to access and remove the pregnancy tissue through the vagina without compromising the integrity of the uterus. The removal of ectopic pregnancy through natural orifices is associated with a lower risk of complications, less postoperative pain and a shorter recovery time. When choosing the best method of treatment, the stage of the pregnancy, the level of beta-hCG hormone and whether the patient is planning a future pregnancy should be taken into account. In more complicated cases, laparoscopic surgery is used [1]. This allows better access to the surgical field and more precise removal of the pregnancy tissue. There is also a more advanced endoscopic technique that can improve the precision of the procedure and the outcome. An intramural pregnancy carries a significant risk of uterine rupture and bleeding due to its location within the myometrium [17].

It therefore requires a highly specialized and personalized approach, combining different therapeutic methods. It is possible that early pregnancies, which are small and have low levels of beta-hCG, may respond to pharmacotherapy with MTX [17]. In this case, close monitoring of the patient's condition and response to treatment is recommended to avoid potential complications. In more advanced cases, laparoscopic removal of the pregnancy and surrounding myometrium is performed. It is thought that it may be beneficial to use measures to control bleeding and minimize the risk of uterine rupture during laparoscopy [17][23]. In cases where access to the pregnancy tissue is possible through the uterine cavity, hysteroscopy may be a treatment option.

The treatment of recurrent ectopic pregnancy remains a major challenge. Each case must be diagnosed and treated individually. In many cases, treatment includes both pharmacological and surgical methods to ensure maximum removal of the pregnancy tissue and to prevent recurrence. An effective treatment for recurrent ectopic pregnancy on salpingectomy remnants is laparoscopy using techniques such as Endoloop [6]. The Endoloop technique involves placing a loop around the pregnancy tissue, allowing precise excision, minimizing the risk of bleeding and sparing adjacent structures [12]. These techniques are particularly recommended for patients who wish to preserve fertility. Microsurgical techniques can be used to remove residual tubal tissue with minimal damage to adjacent organs, which may help to reduce the risk of subsequent ectopic pregnancy.

It can be suggested that advanced treatment may also increase the precision and effectiveness of surgical techniques such as laser ablation and laparoscopic surgery. The use of laser ablation is thought to allow targeted destruction of the pregnancy tissue with minimal damage to adjacent structures [6][18]. Laparoscopy is thought to provide excellent visualization and allow procedures to be performed with greater precision and control [6].

Conclusions

Atypical ectopic pregnancies, i.e. those located outside the fallopian tube, require special attention and a special approach. Because of the multiplicity of places where embryo implantation can occur, each case of atypical ectopic pregnancy requires a detailed diagnosis and a specialized approach, so it is extremely important to continue work to improve diagnostic and therapeutic methods. The diagnostic and therapeutic management of the increasingly common cesarean scar pregnancy has, with the development of minimally invasive techniques, progressed significantly. Methods such as vNOTES have proven to be highly effective in the treatment of this disease entity.

Interstitial pregnancy remains a major diagnostic and therapeutic challenge. In many cases it is treated with both surgical and pharmacological methods. Early diagnosis and treatment are essential to prevent complications such as uterine rupture and hemorrhage.

Recurrent ectopic pregnancy is a particularly difficult case that requires improved treatment methods. Each patient, due to the nature of the disease entity, should undergo a detailed diagnosis and be subjected to an individualized treatment plan aimed at the complete removal of pathological tissue and the prevention of recurrence. The development of modern surgical techniques, such as Endoloop ligation, laser ablation and laparoscopic surgery, may contribute to increasing the curability of this type of ectopic pregnancy.

Disclosure

Author's contribution

Conceptualization, Wiktoria Bilska and Urszula Ciulek; methodology, Urszula Ciulek and Wiktoria Zduńczyk; software, Wiktoria Paduch-Jakubczyk; check, Michalina Dubińska, Anna Dobosz and Michalina Dubińska; formal analysis, Michalina Dubińska and Ada Żydek; investigation, Wiktoria Bilska; resources, Anna Dobosz, Ada Żydek and Wiktoria Zduńczyk; data curation, Anna Dobosz; writing - rough preparation, Wiktoria Paduch-Jakubczyk, Wiktoria Bilska and Anna Dobosz; writing - review and editing, Michalina Dubińska, Ada Żydek, Wiktoria Zduńczyk and Urszula Ciulek; visualization, Wiktoria Bilska; supervision, Wiktoria Paduch-Jakubczyk, Ada Żydek and Urszula Ciulek; project administration, Wiktoria Paduch-Jakubczyk and Wiktoria Zduńczyk; receiving funding, no specific funding.

All authors have read and agreed with the published version of the manuscript.

Funding statement

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflict of interest Statement

The authors deny any conflict of interest.

References

1. Ruby Lin, M.D., Natalie DiCenzo, M.D., and Todd Rosen, M.D. "Cesarean scar ectopic pregnancy: nuances in diagnosis and treatment." *Fertility and Sterility*® Vol. 120, No. 3, PT. 2, September 2023
<https://doi.org/10.1016/j.fertnstert.2023.07.018>
2. Seow KM, Huang LW, Lin YH, Lin MY, Tsai YL, Hwang JL. „Cesarean scar pregnancy: issues in management.” *Ultrasound Obstet Gynecol* 2004; 23: 247–53.
<https://doi.org/10.1002/uog.974>
3. Catalina Diana STANICA, Adrian NEACSU, Romina Marina SIMA, Raluca Gabriela IOAN. "Diagnosis and management of ectopic pregnancy." *Ro J Med Pract.* 2021;16(1)
<http://dx.doi.org/10.37897/RJMP.2021.1.13>
4. Małgorzata Sobstyl, Joanna Tkaczuk-Włach, Wiesława Bednarek, Grzegorz Jakiel. "Diagnosis and Treatment of Ectopic Pregnancy." *Przegląd menopauzalny* 5/2012
<https://doi.org/10.5114/pm.2012.31472>

5. Jan Baekelandt, M.D. and Jona Vercammen, M.D. "IMELDA transvaginal approach to ectopic pregnancy: diagnosis by transvaginal hydrolaparoscopy and treatment by transvaginal natural orifice transluminal endoscopic surgery." *Fertility and Sterility*® Vol. 107, No. 1, January 2017, <http://dx.doi.org/10.1016/j.fertnstert.2016.09.024>
6. Adebayo A. Adeniyi and Christopher A. Enakpen. "Non-tubal Ectopic Pregnancy. Diagnosis and Management." *IntechOpen*, 2019, <http://dx.doi.org/10.5772/intechopen.89783>
7. S. ReStaino, a. Vidiri, L. Anchora Pedone, a. Finelli, M. di Stefano, G. Scambia. "Recurrent ectopic pregnancy on tubal remnant: A case series." *Facts Views Vis Obgyn*, 2021, 13(2):183-186
<https://doi.org/10.52054/2FFVVO.13.2.020>
8. Yoshiki N. „Review of transvaginal natural orifice transluminal endoscopic surgery in gynecology". *Gynecology and minimally invasive therapy*. 2017;6(1):1-5.
<https://doi.org/10.1016/j.gmit.2016.11.007>
9. Gonzalez N, Tulandi T. „Cesarean scar pregnancy: a systematic review." *J Minim Invasive Gynecol* 2017;24:731–8.
<https://doi.org/10.1016/j.jmig.2017.02.020>
10. Cali G, Timor-Tritsch IE, Palacios-Jaraquemada J, Monteagudo A, Buca D, Forlani F, et al. „Outcome of cesarean scar pregnancy managed expectantly: systematic review and meta-analysis." *Ultrasound Obstet Gynecol* 2018;51: 169–75.
<https://doi.org/10.1002/uog.17568>
11. Van Peer S, Baekelandt J. Natural orifice transluminal endoscopic surgery (NOTES) salpingectomy for ectopic pregnancy: a first series demonstrating how a new surgical technique can be applied in a low-resource setting. *Gynecol Surg* 2015;12:299–302.
<https://doi.org/10.1007/s10397-015-0904-6>
12. S. ReStaino, a. Vidiri, L. Anchora Pedone, a. Finelli, M. di Stefano, G. Scambia. "Recurrent ectopic pregnancy on tubal remnant: A case series." *Facts Views Vis Obgyn*, 2021, 13 (2): 183-186,
<https://doi.org/10.52054/FVVO.13.2.020>
13. Ades A, Parghi S. Laparoscopic Resection of Cesarean Scar Ectopic Pregnancy. *J Minim Invasive Gynecol*. 2017 May-Jun; 24(4):533-535
<https://doi.org/10.1016/j.jmig.2016.11.006> [Get rights and content](#)
14. Esther LSY, Chew KT, Rahman RA, Zainuddin AA, Hing EY, Kampan N. Uterine-conserving approach in ruptured intramyometrial ectopic pregnancy. *Horm Mol Biol Clin Investig*. 2020 Mar 13;41(2)
<https://doi.org/10.1515/hmbci-2020-0001>
15. Densley A, Shonnard M, Conklin M, Menghani V, Reddy-Moolamalla S. Angular and interstitial ectopic pregnancies: a clarification of terms and literature review. *Curr Probl Diagn Radiol* 2023;52:84–8
<https://doi.org/10.1067/j.cpradiol.2022.11.005>
16. Anna Sokalska, M.D., Ph.D., Anupama Rambhatla, M.D., Christina Dudley, M.D., b and Bala Bhagavath, M.D. "Nontubal ectopic pregnancy: overview of diagnosis and treatment." *Fertility and Sterility*® Vol. 120, No. 3, PT. 2, September 2023
<https://doi.org/10.1016/j.fertnstert.2023.07.014>

17. Emma Kirk, Katie McDonald, Julia Rees, Abha Govind. "Intramural ectopic pregnancy: Case report and review of the literature." *European Journal of Obstetrics & Gynecology and Reproductive Biology* 168 (2013) 129–133, <http://dx.doi.org/10.1016/j.ejogrb.2012.12.036>
18. Agonistini A, Blanc K, Ronda I. Prognostic value of human chorionic gonadotropin changes after methotrexate for ectopic pregnancy. *Fertility and Sterility*. 2007;88(2):504-506
<https://doi.org/10.1016/j.fertnstert.2006.11.138>
19. Vanitha N Sivalingam, W Colin Duncan, Emma Kirk, Lucy A Shephard, and Andrew W Horne. „Diagnosis and management of ectopic pregnancy”, *J Fam Plann Reprod Health Care*. 2011 Oct; 37(4): 231–240. Published online 2011 Jul 4.
<https://doi.org/10.1136/jfprhc-2011-0073>
20. Kellie Mullany, Madeline Minneci* , Ryan Monjazebe*and Olivia C. Coiado. "Overview of ectopic pregnancy diagnosis and management." *Women's Health*, Volume 19: 1–13, 2023
<https://doi.org/10.1177/17455057231160349>
21. Ann-Marie S, Samantha MD. Early pregnancy risks. In: Alan HD, Nathan L, editors. *Current Obstetric & Gynecologic Diagnosis & Treatment*. 11th ed. New York: McGraw-Hill; 2013. pp. 687-700
22. Zhang J, Sheng Q. Full term abdominal pregnancy: A case report and review of literature. *Gynecologic and Obstetric Investigation*. 2008;65(2):139-141
<https://doi.org/10.1159/000110015>
23. Nabeshima H, Nishimoto M, Utsunomiya H, et al. Total laparoscopic conservative surgery for an intramural ectopic pregnancy. *Diagnostic and Therapeutic Endoscopy* 2010;504062
<https://doi.org/10.1155/2010/504062>