

# Kidney cancer during pregnancy – a case study

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## Summary

A case of a female patient in the third trimester of pregnancy diagnosed with kidney cancer is reported. A multidisciplinary team made a decision to completely remove the kidney in the 32<sup>nd</sup> week of pregnancy; the procedure was conducted successfully. The patient gave birth to a healthy child by vaginal delivery in the 37<sup>th</sup> week of pregnancy.

**Key words:** Kidney cancer; Pregnancy; Radical nephrectomy.

## Introduction

Kidney tumors in pregnant women are rare. The main challenge associated with such cases is to use an effective oncological therapy within an appropriate period of time, providing the highest possible level of safety to the mother and the fetus.

## Case Report

A 34-year-old female patient at 30 weeks gestation reported to Gynecology and Obstetrics University Hospital in Poznań due to hematuria and right lumbar pain. During an ultrasound examination performed by gynaecologist, a right kidney tumor, 7 cm in diameter, was found. On the same day during a urologist consultation, the presence of right kidney tumor was confirmed. Abdominal ultrasonography revealed the presence of an isoechoic tumorous growth of heterogeneous echostructure in the right kidney, 7×6 cm in size, originating from the lower renal pole, with developed pathological blood flow (Figure 1). The ultrasound image and clinical symptoms suggested the presence of a malignant lesion in the right kidney. Magnetic resonance imaging was planned, but the patient refused the procedure.

A medical council composed of gynecologists and urologists decided to remove the kidney before delivery. Such decision was taken because there was a high risk of disease progression or even tumor rupture during pregnancy. Blood cell count, biochemical analysis, coagulation profile, and urine culture did not reveal any deviations from the norm.

Before the operation, during the hospitalization in Gynecology and Obstetrics University Hospital in Poznań, the patient received corticosteroids in case of preterm labour as a complication of surgery. At that time no signs of threatened preterm labour were found and a normal fetal growth and development were confirmed.

The lumbar incision was employed to perform open retroperi-

toneal nephrectomy. During the procedure, the presence of a large kidney tumor was revealed in the area of the lower renal pole. The dissected kidney was removed completely, together with the tumor, which was not infiltrating the surrounding tissue. No abdominal lymph node enlargement was reported during the procedure. The course of the surgery and anesthesia was uneventful; blood loss was not significant.

The acquired preparation was subjected to histopathological examination. Macroscopic examination revealed the presence of a tumor in the lower renal pole, 10×7×7 cm in diameter, brown in color (Figures 2 and 3). Microscopic examination confirmed the presence of Stage pT2a clear cell carcinoma of the kidney; G1 cellular differentiation according to the Furhman scale. No vascular infiltration was found; section lines of renal hilar vessels and the ureter were free from neoplastic lesions.

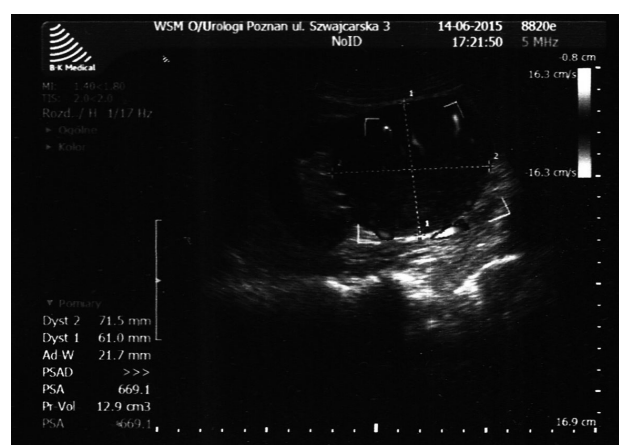


Figure 1. — Ultrasound image of isoechoic tumorous growth of heterogeneous echostructure in the right kidney, originating from the lower renal pole, with developed pathological blood flow.

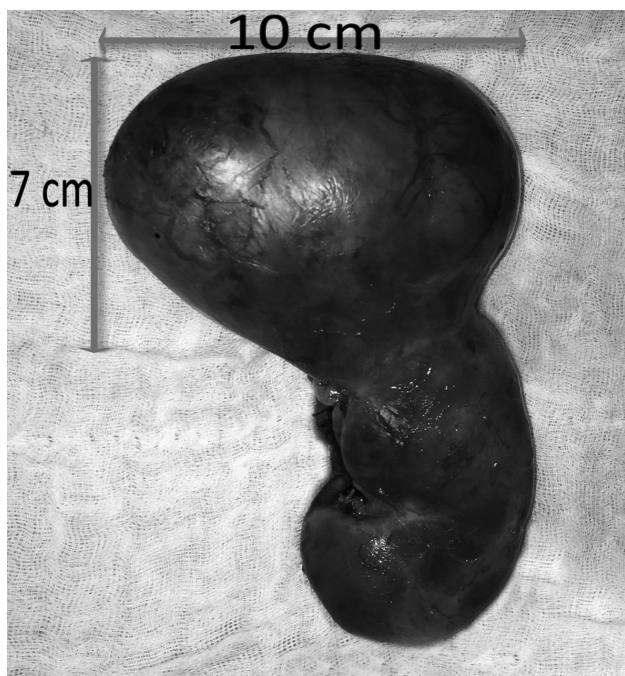


Figure 2. — Gross appearance of the surgical specimen.

On the second postoperative day, the patient was transferred to the Gynecology and Obstetrics Hospital in Poznań. During the hospitalization a normal course of pregnancy, including adequate fetal development was found. She was sent home ten days after surgery.

At 37 weeks of gestation the patient was readmitted again to Gynecology & Obstetrics University Hospital in Poznań. A normal fetal growth was found. On the day of admission to the hospital, the patient was transferred to a delivery room because of regular uterine contractions. She delivered healthy girl 2,940 grams, Apgar score 10. The patient's postpartum course was uneventful. She received antibiotics and low-molecular weight heparin. She was sent home three days after the labor.

## Discussion

According to epidemiological data, kidney tumors constitute 3% of all tumors found in adult patients [1]. Currently, there is no precise epidemiological data concerning the incidence of kidney cancer in pregnant patients. According to the American Gynecological & Obstetrical Society, the incidence of tumors during pregnancy is estimated at one per 10,000 cases, while for urinary tumors it is 13 per 1,000,000 cases [2]. In Europe, on the other hand, the concurrence of pregnancy and tumors is estimated at 3,000 to 5,000 new cases each year [3]. The low incidence of kidney cancer in pregnant women may result from the fact that the highest increase in incidence is reported between the ages of 50 and 70 years [4]. The literature currently contains descriptions



Figure 3. — Right kidney tumor section.

of approximately 100 cases of malignant tumors and 50 cases of benign lesions. The majority of the benign lesions are angiomyolipomas (43 cases), while the malignant lesions are mainly represented by renal cell carcinoma (RCC - 85 cases) [5].

In most cases, kidney tumors present without any symptoms and are found occasionally during imaging examinations conducted for other reasons. The classic triad of symptoms in kidney cancer includes hematuria, lumbar pain, and the presence of a palpable mass. The simultaneous presence of the above symptoms is reported in 21% of pregnant patients and correlates with more advanced stages of the disease. The most common symptoms found in pregnant women with diagnosed kidney cancer include: the presence of a mass palpable through the integuments - 88%, pain in the lumbar area - 50%, hematuria - 47%, or hypertension - 18% [6]. These symptoms may, however, be concealed by concurrent pregnancy. This especially concerns the second and third trimesters of pregnancy, when the enlarged uterus of a pregnant woman hinders the detection of a tumor by palpation. On the other hand, the increased number of examinations conducted during pregnancy, especially ultrasound, constitutes a predisposing factor to early kidney tumor detection.

Hormonal changes taking place in the course of pregnancy and their potential influence on the metabolism of kidney cancer cells constitute a separate issue. It is known that kidney cancer cells exhibit estrogen receptor expression; therefore, they should theoretically be stimulated to higher proliferation in an environment with increased concentration of estrogen [7]. It has not yet been proven that the changes in hormone balance occurring during pregnancy affect the carcinogenesis of kidney cancer.

If a kidney tumor is suspected, the diagnostics should include the following laboratory tests: blood cell count, bio-

chemical analysis, urinalysis with culture, and urine cytology.

Transabdominal ultrasound is the imaging examination of first choice in cases of suspected kidney cancer, with an estimated sensitivity of 85% [8]. Moreover, its use is not associated with any risk of exposing the fetus to harmful factors. It should be emphasized that a diagnosis established with the use of this tool may not be sufficient to make a therapeutic decision, especially in the case of small kidney tumors. The gold standard in kidney tumor diagnostics is contrast enhanced computed tomography, but due to the risk of exposing the fetus to teratogenic factors, such as ionizing radiation and contrast agents, it cannot be used in pregnant women. Magnetic resonance with gadolinium contrast is a method of comparable sensitivity and specificity to contrast enhanced CT [9]. Magnetic field poses no significant danger to the fetus however the use of gadolinium contrast during pregnancy is controversial, because studies conducted on rats showed that it permeates the placenta and damages the fetus [10, 11]. Therefore, magnetic resonance without contrast should be utilized to verify suspicious kidney lesions in pregnant patients; contrast should be used in exceptional cases only.

The treatment method of choice for patients with kidney tumors is radical nephrectomy or nephron sparing surgery (NSS) [12]. Radical nephrectomy consists in the removal of the entire kidney together with the surrounding fat and Gerota's fascia. The procedure should be conducted in cases of large tumors, over 7 cm in diameter, or disadvantageous tumor locations inside the organ. The NSS procedure consists in removing the tumor only, sparing the healthy parenchyma of the kidney. It may be used in cases of kidney tumors occurring in advantageous locations or if their diameter does not exceed 7 cm. The most important advantage is the sparing of healthy kidney parenchyma, which reduces the risk of dialysis therapy in the future. Both radical nephrectomy and the NSS procedure may be conducted via laparoscopy [13]. The undeniable advantages of the laparoscopic approach include shorter duration of the procedure, shorter reconvalescence, reduced risk of bleeding, and better cosmetic effect. Laparoscopic procedures, however, also have certain drawbacks, as they require the creation of pneumoperitoneum, which increases the pressure in the abdominal cavity and has a negative impact on the blood supply of the fetus. Another important problem is the possibility of damaging the uterus of the pregnant women when placing laparoscopic ports [14]. Numerous instances of successful radical and partial nephrectomy conducted via laparoscopy in the course of pregnancy were reported to date [15]. It needs to be emphasized that the operative technique is decided upon mainly based on the experience of the surgical team.

For pregnant patients with diagnosed neoplastic diseases, the time of the initiation of treatment is a strategic decision. The considered scenarios may take into account

the termination of pregnancy before the beginning of treatment, immediate beginning of treatment, and its postponement until the fetus reaches viability or until delivery. The initiation of oncological treatment during pregnancy is associated with the exposure of the fetus to numerous harmful factors, which may result, among others, in pregnancy loss. On the other hand, from the oncological point of view, postponing the procedure and adopting a "wait-and-see" approach may result in the progression of the disease to a more advanced stage. Finding a compromise is extremely difficult, even more so because there are currently no guidelines of either gynecological or urological societies which would take such cases into account. Thus, it may seem that the following factors need to be considered when making this decision: the stage of pregnancy and potential risk of complications to the fetus, tumor type (malignant vs. benign), tumor size and growth dynamics, stage of the disease (e.g. presence of metastasis), and risk of the intensification of clinical symptoms. According to the literature, if a malignant tumor is found during the first trimester of pregnancy, surgery should be performed without any unnecessary delay, which is supported by the fact that the rate of miscarriage is the highest at that stage [16]. In the second trimester, conducting the procedure should also be considered as justified, but some authors recommend waiting until the 28<sup>th</sup> week in order for the lungs of the fetus to mature [17]. The third trimester of pregnancy is characterized by the highest risk of premature birth. Taking into account the short time before delivery, it seems that in this period it would be rational to postpone the procedure until the delivery takes place [18]; however, if it is necessary to perform the procedure immediately in this trimester (e.g. a large tumor is compressing the pregnant uterus), the care of an experienced neonatal team, capable of securing the fetus in the event of premature birth, should be provided.

## Conclusions

Each case of a patient diagnosed with a malignant tumor during pregnancy should be analyzed separately. The decision concerning the initiation of treatment should be made by an interdisciplinary team including specialists from the following fields: urology, gynecology, radiology, oncology, and neonatology. The team should mainly focus on ensuring the well-being of the fetus and selecting an adequate method of treatment in an appropriate period of time. Another issue that should also be taken into consideration is the periodic examinations conducted multiple times during pregnancy, especially transabdominal ultrasound, aimed at assessing the condition of the fetus. If such ultrasound examinations also focused on the assessment of organs, it may potentially enable the detection of numerous cases of neoplastic diseases in earlier stages.

## References

- [1] Pearson G.A., Eckford S.D.: "Renal cell carcinoma in pregnancy". *J. Obstet. Gynaecol.*, 2009, 29, 53.
- [2] Smith L.H., Danielsen B., Allen M.E., Cress R.: "Cancer associated with obstetric delivery: results of linkage with the California cancer registry". *Am. J. Obstet. Gynecol.*, 2003, 189, 1128.
- [3] Pentheroudakis G., Pavlidis N.: "Cancer and pregnancy: poena magna, not anymore". *Eur. J. Cancer*, 2006, 42, 126.
- [4] Ellis W.J.: "Epidemiology and etiology of renal cell carcinoma". In: *Principles and practice of genitourinary oncology*. Raghavan D., Scher H.I., Leibel S.A., Lange P.H. (eds). Philadelphia, PA: Lippincott-Raven, 1997, 795.
- [5] Boussios S., Pavlidis N.: "Renal cell carcinoma in pregnancy: a rare coexistence". *Clin. Transl. Oncol.*, 2014, 16, 122.
- [6] Walker J.L., Knight E.L.: "Renal cell carcinoma in pregnancy". *Cancer*, 1986, 58, 2343.
- [7] Concolino G., Lubrano C., Ombres M., Santonati A., Flammia G.P., Di Silverio F.: "Acquired cystic kidney disease: the hormonal hypothesis". *Urology*, 1993, 41, 170.
- [8] Warshauer D.M., McCarthy S.M., Street L., Bookbinder M.J., Glickman M.G., Richter J., et al.: "Detection of renal masses: sensitivities and specificities of excretory urography/linear tomography, US, and CT". *Radiology*, 1988, 169, 363.
- [9] Nikken J.J., Krestin G.P.: "MRI of the kidney - state of the art". *Eur. Radiol.*, 2007, 17, 2780.
- [10] Garcia-Bourmissen F., Shrim A., Koren G.: "Safety of gadolinium during pregnancy". *Can. Fam. Physician*, 2006, 52, 309.
- [11] Nicklas A.H., Baker M.E.: "Imaging strategies in the pregnant cancer patient". *Semin Oncol.*, 2000, 27, 623.
- [12] Robson C.J., Churchill B.M., Anderson W.: "The results of radical nephrectomy for renal cell carcinoma". *J. Urol.*, 2002, 167, 873.
- [13] Yin L., Zhang D., Teng J., Xu D.: "Retroperitoneal laparoscopic radical nephrectomy for renal cell carcinoma during pregnancy". *Urol. Int.*, 2013, 90, 487.
- [14] Fatum M., Rojansky N.: "Laparoscopic surgery during pregnancy". *Obstet. Gynecol. Surv.*, 2001, 56, 50.
- [15] Loughlin K.R.: "The management of urological malignancies during pregnancy". *Br. J. Urol.*, 1995, 5, 639.
- [16] Wilcox A.J., Weinberg C.R., O'Connor J.F., Baird D.D., Schlatterer J.P., Canfield R.E., et al.: "Incidence of early loss of pregnancy". *N. Engl. J. Med.*, 1988, 28, 189.
- [17] Cohen-Kerem R., Railton C., Oren D., Lishner M., Koren G.: "Pregnancy outcome following non-obstetric surgical intervention". *Am. J. Surg.*, 2005, 190, 467.
- [18] Buda A., Pizzocaro G., Ceruti P., Salvioni R., Battistello M., Vergani P.: "Case report: renal cell carcinoma presenting as hypertension in pregnancy". *Arch. Gynecol. Obstet.*, 2008, 277, 263.

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