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## Case Report

# Pseudomyxoma peritonei involving the canal of Nuck: The added value of magnetic resonance imaging for detection and presurgical planning<sup>☆,☆☆</sup>

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## ABSTRACT

The canal of Nuck is an abnormal patent pouch of the parietal peritoneum caused by the incomplete obliteration of the processus vaginalis in females. The most common disorders of the canal of Nuck are: hernia, hydrocele and endometriosis. Pseudomyxoma Peritonei (PMP) is a clinical condition characterized by the accumulation of mucinous material on the surfaces and in the recesses of the peritoneal cavity, resulting from the perforation of an appendiceal mucinous neoplasm. We report the case of a young woman with a clinical history of chronic pelvic pain and infertility who was referred to our center after being diagnosed with appendiceal mucinous neoplasm and PMP. MRI staging examination revealed the right canal of Nuck filled with mucinous material, which was confirmed at surgery. The involvement of canal of Nuck is extremely rare in PMP. MRI provides a sensitive imaging modality for appropriate preoperative planning of PMP and helps surgeons identify uncommon disease sites such as the canal of Nuck in women, which, if missed, may prevent complete cytoreductive surgery.

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## Introduction

Pseudomyxoma Peritonei (PMP) is a clinical condition characterized by the accumulation of mucinous material on the surfaces and the recesses of the peritoneal cavity, resulting from the perforation of a mucinous appendicular neoplasm [1].

Ultrasound (US) is valuable for assessing the appendicular region, while cross-sectional imaging (Computed Tomography, CT, and Magnetic Resonance Imaging, MRI), before and after intravenous contrast medium injection, plays an important role in the diagnosis and follow-up of PMP [2]. In addition, both CT and MRI allow staging of the disease using scoring systems, such as Peritoneal Cancer Index (PCI) [2]. The main advantages of CT over MRI are its high spatial resolution and easy availability, which is why CT is still the most commonly used method to assess PMP [2]. On the other hand, MRI, having a better contrast resolution provides better visualization of the distribution of mucinous material along the recesses of the peritoneal cavity. MRI also, exploiting a multiparametric approach, allows better depiction of small peritoneal implants that may be obscured by the mucinous ascites at CT [2].

The canal of Nuck is an abnormal patent pouch of the parietal peritoneum in the female caused by the incomplete obliteration of the processus vaginalis. The most common disorders of the canal of Nuck are: hernia, hydrocele and endometriosis [3].

The involvement of canal of Nuck is extremely rare in pseudomyxoma peritonei. We report a case of a young female patient showing such condition emphasizing the role of MRI in its detection.

## Case presentation

A 38-year-old woman presented to a gynecologist with chronic pelvic pain and infertility. Laboratory findings, including tumor markers, were unremarkable.

US and contrast-enhanced multi-detector CT (not shown) performed at another hospital showed a cystic lesion in the right iliac region and a mild amount of ascites. Laparoscopic

exploration revealed appendiceal mucocele and mucinous material in the peritoneal cavity: appendectomy and peritoneal sampling were performed. Histopathologic analysis revealed a low-grade mucinous carcinoma of the appendix spread widely into the peritoneal cavity (pseudomyxoma peritonei) [1].

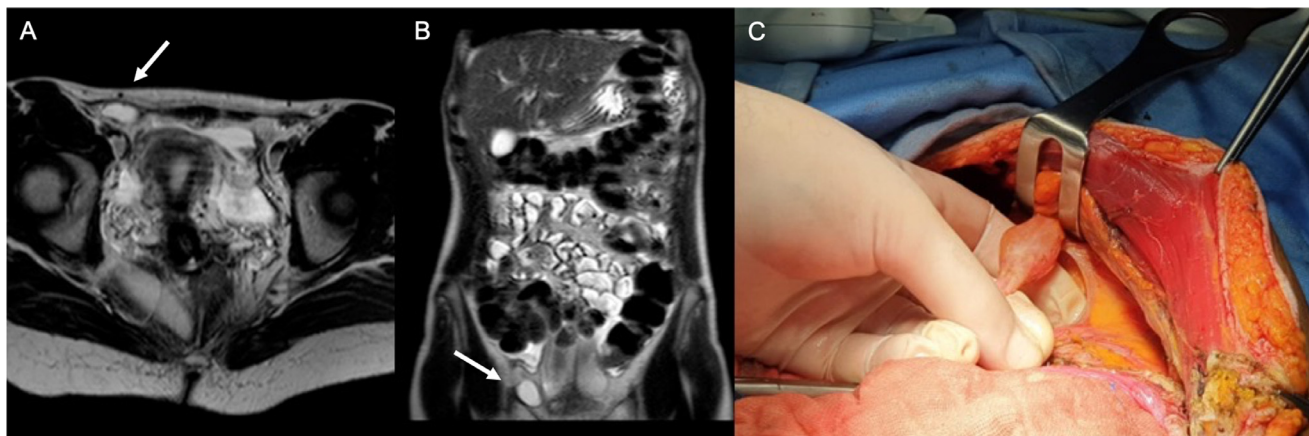
The MRI performed to stage the disease showed distribution of mucinous material in the peritoneal cavity with an estimated PCI = 13. MRI also showed a canal of Nuck containing a small amount of mucinous material on the right-hand side, which was easily seen on T2w images because of its typical localization and bright signal intensity related to the water content of the mucin (Fig. 1 A-B, arrows).

Cytoreductive surgery and excision of the Canal of Nuck (Fig. 1 C) were performed, followed by hyperthermic intraperitoneal chemotherapy (HIPEC). The estimated PCI at surgery was 14 and histopathologic analysis confirmed the mucinous content of the canal of Nuck. After 19 days, the patient was discharged without major complications.

## Discussion

The canal of Nuck, caused by the failed closure of the processus vaginalis in females, is an abnormal patent pouch (glove finger-shaped like) of the parietal peritoneum through the inguinal canal to the labia majora. The most frequent disorders include: hernia, hydrocele and endometriosis [3]. Such disorders usually manifest as swelling of the groin, sometimes accompanied by discomfort and pain.

PMP is a progressive disease characterized by an accumulation of mucinous material on the surfaces and in the recesses of the peritoneal cavity. It is thought to result from perforation of an appendiceal mucinous neoplasia, due to vascular compression or wall infiltration [1]. It is usually incidentally discovered in people undergoing imaging for other reasons, although some patients present with nonspecific symptoms or signs such as abdominal pain or distension, appendicitis-like symptoms, or infertility [1]. PMP may spread along peri-



**Fig. 1 – (A)** T2w MRI axial image shows a fluid filled cystic lesion (white arrow) in the right inguinal region. **(B)** T2w MRI coronal image shows a panoramic view of the abdomen and the canal of Nuck containing mucinous material on the right-hand side (white arrow). **(C)** The image shows the canal of Nuck during surgical excision.

toneal tunnels such as the inguinal canal or the canal of Nuck: at these sites, mucinous material may remain hidden during laparoscopic exploration and prevent complete cytoreductive surgery [4,5].

US and CT may be helpful in evaluating these regions, but they may result inconclusive if only a small amount of mucin is present. MRI is a sensitive and panoramic mapping technique for appropriate preoperative planning of PMP thanks to its high contrast resolution and ability to characterize tissues based on the different behavior of substances in different sequences, without the use of ionizing radiation. The T2w bright signal intensity of mucinous material, related to its water content, and the diffusion restriction of water molecules on high-b value (800-1000) DWI- weighted images of solid implants in case of cellular PMP, are the mainstay of MRI staging of PMP and allow to obtain a PCI essentially equivalent to laparoscopy [6]

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## Conclusions

Involvement of canal of Nuck is extremely rare in pseudomyxoma peritonei: surgeons should be aware of this finding. MRI with high contrast resolution and a panoramic approach allows the demonstration of unusual sites of such disease in women, which, if missed, may preclude complete cytoreductive surgery.

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## Declarations

- I. The authors have not received funding for this paper
- II. All procedures performed in the study were in accordance with the ethical standards of the institutional and/or

national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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