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**Roisin M. Heaney, Patricia Cronin, Maurice Stokes**

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**Case Report:** A 75-year-old female presented with multifocal invasive lobular carcinoma in association with a ventriculoperitoneal shunt. The patient did not include insertion of a VP shunt in her medical history during the initial consultation and this in conjunction with the absence of the shunt catheter on preoperative imaging resulted in the unexpected discovery of the VP shunt adjacent to the tumour intra-operatively. Meticulous dissection allowed for preservation of the VP shunt and the patient had an unremarkable recovery.

**Conclusion:** Preoperatively, a thorough history is essential for the safe provision of patient care. Neurosurgeons must give due consideration to the possibility of future oncological breast surgery when planning insertion of a ventriculoperitoneal shunt.



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CASE REPORT

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# Breast cancer in association with a ventriculoperitoneal shunt: An unexpected discovery

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## ABSTRACT

**Introduction:** Breast cancer and ventriculoperitoneal (VP) shunts are independently, relatively common entities. However, the development of cancer in the presence of a shunt catheter is a rare occurrence. **Case Report:** A 75-year-old female presented with multifocal invasive lobular carcinoma in association with a ventriculoperitoneal shunt. The patient did not include insertion of a VP shunt in her medical history during the initial consultation and this in conjunction with the absence of the shunt catheter on preoperative imaging resulted in the unexpected discovery of the VP shunt adjacent to the tumour intra-operatively. Meticulous dissection allowed for preservation of the VP shunt and the patient had an unremarkable recovery. **Conclusion:** Preoperatively, a thorough history is essential for the safe provision of patient care. Neurosurgeons must give due consideration to the possibility of future oncological breast surgery when planning insertion of a ventriculoperitoneal shunt.

**Keywords:** Breast, Cancer, Mastectomy, Ventriculoperitoneal shunt

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## INTRODUCTION

Breast cancer is an increasingly common phenomenon worldwide. In Ireland, 1 in 9 women developing the disease throughout their lifetimes [1]. Insertion of a ventriculoperitoneal (VP) shunt is the primary treatment for adult and paediatric hydrocephalus [2, 3] and remains one of the most commonly performed neurosurgical procedures [4]. While these are two relatively common entities, the occurrence of breast cancer in the presence of a VP shunt is a very rare event. To date only five cases have been documented in literature.

## CASE REPORT

A 75-year-old female was referred to a symptomatic breast clinic with a three-month history of right sided mastalgia. Her past medical history was notable for hypertension, obesity, atrial fibrillation and an intracerebral hemorrhage nine years previously. Risk factors for breast cancer included advanced age and late menopause. Clinical examination was unremarkable and a VP shunt was not palpable. Mammography, however, revealed two small areas of calcification in the right breast, one at the 3 o'clock and the other at the 12 o'clock position, as well as an area of calcification in the left breast. An ultrasound guided biopsy was performed and histology revealed invasive lobular carcinoma at both sites in the

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right breast and high grade DCIS in the left breast. The VP shunt was not visualized on mammogram or ultrasound (Figure 1). Following discussion at a multidisciplinary meeting, she proceeded to bilateral mastectomy and sentinel lymph node (SLN) biopsy. Intraoperatively, the VP shunt was encountered unexpectedly deep in the right breast, five centimetres from the midline (Figure 2). Meticulous dissection ensued, particularly at the site of the known tumor in the 3 o'clock position. The VP shunt was preserved and specimen sent for histology. The patient remained on IV antibiotics until the drains were removed due to the presence of the VP shunt. Medical records were obtained from another hospital which revealed the patient had undergone insertion of a VP shunt for relief of hydrocephalus secondary to the intracerebral hemorrhage. Final histology revealed diffuse DCIS in the left breast and two invasive grade 2 ER/PR + lobular carcinomas in the right breast. The cancer in the 3 o'clock position was 2 cm in size and present within 1.4 mm of the deep resection margin. The right SLN biopsy was positive for micrometastases. The patient had an unremarkable postoperative course and underwent four cycles of adjuvant chemotherapy (adriamycin, cyclophosphamide and paclitaxel). She was well with no signs of recurrence six months postoperatively and was commenced on hormonal therapy.

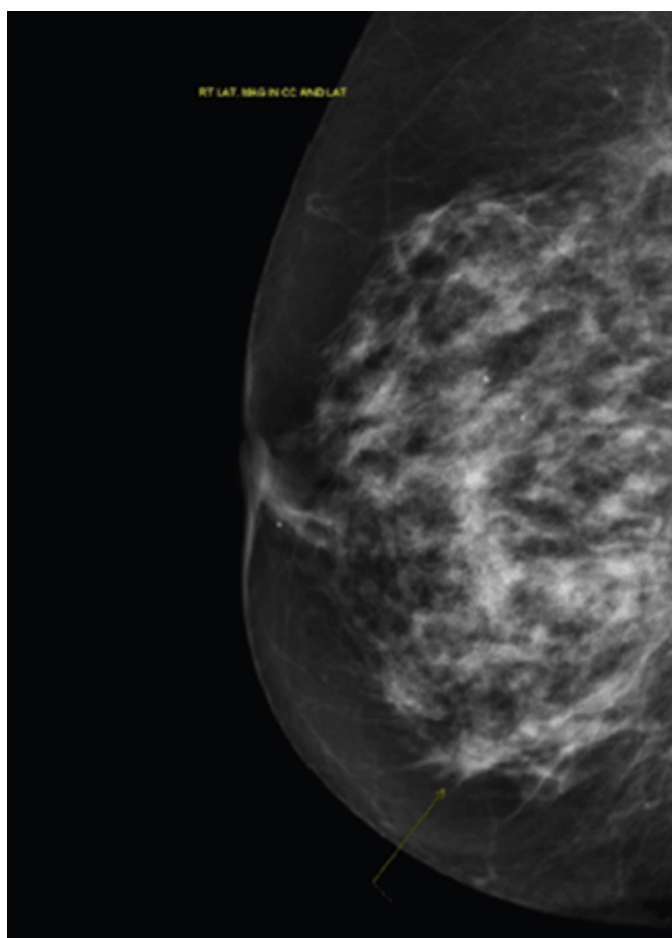


Figure 1: Absence of ventriculoperitoneal shunt catheter on mammography.



Figure 2: Discovery of the shunt catheter 5 cm from the midline. [left = cephalad, right = caudal]

## DISCUSSION

Breast related VP shunt complications including; shunt migration, CSF pseudocyst, CSF 'galactorrhea' and shunt obstruction, are well documented in literature and represent a class of thoracic shunt complications [5]. To date however, only five cases of breast cancer adjacent to a ventriculoperitoneal shunt have been described. The most recent case reports on a 74-year-old patient with invasive ductal carcinoma encasing a VP shunt which, despite surgery, chemotherapy and radiotherapy, recurred on two occasions. The patient declined any further treatment or replacement of the shunt upon diagnosis of the latest recurrence [6]. Jain et al. described the case of a 67-year-old woman with a screen detected invasive carcinoma encircling a VP shunt which had been inserted following excision of an ependymoma. The VP shunt in this case had to be rerouted by the neurosurgeons during the wide local excision [7]. The third case describes a 70-year-old female who presented with neurological symptoms secondary to extrinsic VP shunt compression by a large breast mass. Intraoperatively, there was no identifiable flow distal to the breast mass and she underwent a modified radical mastectomy with relocation of the VP catheter [8]. The

fourth case from New York reports an 88-year-old patient with advanced dementia with multicentric invasive lobular carcinoma. The presence of the VP shunt was only identified following review of her medical notes. While a mastectomy was indicated, a decision to excise only the mass around the VP catheter was made based on the patients multiple comorbidities and poor premorbid status [9]. The earliest documented case in 2001 involved a 52-year-old who underwent a modified radical mastectomy for a 5 cm invasive carcinoma. Review of her medical notes revealed insertion of a VP shunt for hydrocephalus secondary to an acoustic neuroma 5 years previously. Intraoperatively, the shunt was identified 5 cm from the midline inside the mastectomy incision [10].

Extreme care and preoperative planning is essential in the management of invasive breast carcinoma involving a VP shunt. In many cases, identifying the presence of a VP shunt may be difficult due to patient factors (dementia, forgetfulness, etc.) or incomplete medical notes. Failure to identify its presence can be further confounded by its apparent absence on imaging studies, as happened in our case. Care must be taken to avoid iatrogenic injury to the VP catheter during investigation and work up of the cancer (fine needle aspiration or core biopsy) as well as definitive management of the tumour. The location of the shunt in relation to the tumour may preclude certain types of surgery or may require involvement of the neurosurgical team for relocation of the shunt as happened in cases two and three described above [7, 8]. The possibility of seeding of tumor cells on the shunt catheter surface was raised by Copeland-Halperin et al. as their patient developed multiple recurrences despite adequate therapy [6]. When planning insertion of a VP shunt, neurosurgeons must give due consideration to the possibility of future oncological breast surgery and site the catheter accordingly [10].

Our case highlighted the importance of obtaining a patient's medical history as well as reviewing their medical notes preoperatively. Without knowledge of its existence, no neurosurgical opinion was sought perioperatively. Meticulous dissection allowed for removal of the breast tissue and preservation of the ventriculoperitoneal shunt catheter.

## CONCLUSION

We report the case of a 75-year-old patient with invasive lobular carcinoma in which a ventriculoperitoneal shunt catheter was discovered adjacent to the tumour intraoperatively. Our case emphasises the importance of reviewing the patient's medical history on the morning of surgery. In addition to this, neurosurgical team should be conscious of the position of a ventriculoperitoneal (VP) shunt in female patients, taking into account the increasing incidence of breast cancer and the possible requirement of future oncological surgery.

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## Author Contributions

Roisin M. Heaney – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Patricia Cronin – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Maurice Stokes – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

## Guarantor

The corresponding author is the guarantor of submission.

## Conflict of Interest

Authors declare no conflict of interest.

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