

Recovering elective breast surgery during the era of COVID-19 - using regional anaesthesia to allow day case risk reducing mastectomy and immediate breast reconstruction

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Introduction: For many patients routine breast cancer surgery is low risk and can normally be delivered safely within the context of day case pathways. However, larger and more complex surgery, including breast reconstruction, has typically required a longer hospital admission or overnight stay. In the current Coronavirus Pandemic climate, many surgeries requiring admission are at risk of cancellations, due to hospital pressures or staff shortages. Furthermore, when day-case treatments are planned, a number of patients end up with unforeseen admission, often due to pain, post-operative nausea and vomiting, or prolonged sedation. As such, new methods of maximising theatre and hospital efficiency should be sought. Regional anaesthesia can help reduce negative effects of general anaesthesia and when used with the correct expertise can help facilitate day case surgery by maximising postoperative analgesia, reducing discomfort and minimising nausea. Currently, there is little evidence that evaluates the outcomes of day case implant based breast reconstruction within the risk reduction setting, and even less for the use of regional anaesthesia in this setting.

Conclusion: Clinical outcomes including anaesthetic and surgical time, time through recovery and to discharge will be gathered. Complication data will also be collected alongside psychosocial and quality of life outcome measures.

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Introduction:

Breast cancer remains one of the most commonly occurring solid organ cancers, not only in the United Kingdom but across the world. Whilst many patients can be treated successfully with breast conservation surgery, a number of patients still require mastectomy. Mastectomy as an absolute indication remains reserved for those with inflammatory cancer, previous radiotherapy, and patients wishing to undergo risk reduction. It is this genetically 'at risk' cohort who are commonly younger when undergoing surgery and who most often elect for post mastectomy breast reconstruction.

Breast cancer-associated genes include BRCA1, BRCA2, PTEN, TP53, CDHI and STK11, alongside mutations in various other rarer and less penetrable genes. Mutations in BRCA1 on chromosome 17 and BRCA2 on chromosome 13 are found to be accountable for the majority of hereditary breast cancer cases and consequently, Hereditary Breast and Ovarian Cancer syndrome (HBOC). The autosomal dominant inheritance of these mutated genes results in a lifetime risk of breast cancer of between 50-85% in female carriers, and a slight risk in male carriers. The lifetime risk of ovarian cancer also increases by 10-40% in BRCA1 carriers and 10-20% in BRCA2 carriers.^{1,2} In the UK, NICE guidelines recommend regular breast cancer surveillance in the form of mammograms for the general population via the screening programme, and magnetic resonance imaging (MRI) for women in certain age groups with known or a high probability (over 30%) of having BRCA1, BRCA2 or TP53 mutations. Counselling on breast awareness and self-examination is offered for those with mutations, alongside genetic and psychological counselling for those considering risk-reducing surgery.³ Risk-reducing bilateral mastectomies with immediate or delayed reconstruction is offered by the NHS to patients with a genetic pre-disposition to breast cancer and can decrease the risk of developing breast cancer by up to 95%.^{3,4,5} Bilateral prophylactic salpingo-oophorectomies and chemoprevention drugs such as tamoxifen and raloxifene hydrochloride can also be offered.⁶

Current NHS guidelines recommend mastectomy patients to be kept overnight after their surgery, with the majority discharged the following day. If immediate reconstruction has been done, the hospital stay is often prolonged, in some cases for up to a week depending on reconstruction type and patient recovery.⁷ However, during the pandemic risk-reducing mastectomies and reconstruction were temporarily suspended in many units to prioritise higher risk breast cancer patients. Although many units have since resumed, there remains a significant backlog of patients waiting for surgery. Limited NHS resources have been attributed to the ongoing COVID-19 pandemic. Lack of capacity for inpatients, pressures on limiting admissions and contact, and staff shortages have also exacerbated this issue. As a result, innovative ways of working are being developed, and in some circumstances new surgical pathways for breast surgery are being introduced.

Across many surgical specialties, including breast cancer surgery, day-case surgery has been shown to improve patient satisfaction, reduce length of hospital stay, and lessen the rates of hospital-acquired infections, with no increase in complication rates. However, there is limited research on the role of day case surgery for breast reconstruction, and with the continued pressures on waiting lists following the COVID pandemic, this area needs to be explored in greater depth.⁸ What evidence there is, particularly relating to immediate pre-pectoral implant-based reconstruction (IBR) specifically as a day-case surgery, is mainly retrospective in nature. Shaker et al. explored this with 47 subjects' data collected retrospectively between 2017-19. They concluded that day-case mastectomies with IBR had a success rate of approximately 90% and indicates the reasons for longer than day case admission as simple nausea/dizziness (three patients), a minor haemoglobin drop that did not require transfusion (one patient) and urinary retention requiring overnight urethral catheterisation (one patient). No patients required a return to theatre in the first 48 hours postoperatively. Longer admissions were also seen in patients with complications such as superficial skin necrosis, postoperative infections, and implant loss. Whilst eight patients required reoperation, the results of this study were generally positive. However, only two of the patients in the cohort had risk-reducing mastectomies, with the rest receiving treatment for pre-existing tumours. As such, little can be extrapolated to patients undergoing risk-reducing surgery who represent a slightly different patient cohort with different healthcare demographics.^{8,9} Similarly, further retrospective studies including that performed by Zhou et al explored endoscopic breast reconstruction as day surgery during COVID-19. In Their study BREAST-Q questionnaires were given to 66 patients to gather patients' postoperative satisfaction. No statistical difference was found between day-case groups and those kept overnight, but lower hospitalisation costs and shorter operative times were noted in day-cases, which was concluded to be a safe and reliable treatment pathway.¹⁰ In general, the retrospective nature of these studies put limitations on lack of qualitative data in the form of questionnaires, patient, and staff experiences. Dumestre et al. looked at enhanced recovery after surgery (ERAS) models for breast reconstruction through retrospective

and prospective studies. They found that day surgery, alongside multimodal analgesia and preoperative anti-emetics, were safe with no higher rates of readmissions or complications compared to standard recovery protocol. The prospective nature of the study allowed for the use of quality-of-recovery assessments and concluded improved patient satisfaction with the ERAS model. However, the inclusion criteria for the studies required patients to be of ASA class 1 or 2 and BMI <35, which although meet the recommendations for patients suitable to undergo day case surgery, does not account for and is not generalizable to other groups.^{11,12} Similarly, a study by Cordeiro et al. concluded same-day breast reconstructive surgery to be a safe option when comorbidities were accounted for. Their criteria required patients to have no high-risk co-morbidities or concurrent surgery. Furthermore, despite their large cohort of 21,539 patients, 94.5% were admitted for prolonged periods of time and only 5.5% were successfully treated as day cases, raising uncertainties about the sample size from which conclusions were drawn.¹³

In order to facilitate day case surgery, loco-regional anaesthesia and the avoidance of high dose opiate has been utilised widely. Along with the theorised reduction in stress response and the oncological advantages that follow, the avoidance of opiate has been linked with a significant reduction in post-operative nausea and vomiting (PONV).^{14,15} This is understood to be of clinical significance as PONV has been shown to represent the most common reason for unexpected overnight admission in patients otherwise anticipating to be treated on day case pathways, and can occur in up to 80% of cases.^{16,17} One particular method of loco-regional anaesthesia utilised in breast surgery involves the administration of local anaesthetic immediately laterally to the vertebrae, in the space where the spinal nerves exit from the intervertebral foramina, and is known as a paravertebral block (PVB).¹⁸

Perioperative paravertebral block as a method to reduce post-operative pain and improve mobilisation after breast reconstruction has been investigated in various studies. Many of these are included in the review by Parikh et al.¹⁹ The first prospective study by Wolf et al in 2016 concluded PVB as having considerable potential for improving pathways for patients undergoing breast reconstruction, with significantly improved postoperative pain control and lesser need for opioids.²⁰ Abdallah et al reported improvement in postoperative Quality of Recovery scores.²¹ Fahy et al. further found a decreased need for postoperative antiemetics and complications of nausea and vomiting.²² Parikh et al. found the same conclusions, alongside a reduced median length of patients' hospital stay. Their study showed an average of 95 hours (4 nights) in hospital in patients' with PVB, compared to 116 (5 nights) with general anaesthesia.²³ Although a noticeable difference this study, similar to others, focused only on autologous breast reconstruction, and little research evaluates the role of PVB in day-case, implant based breast reconstruction.

Having established a need for improved pathways to facilitate day case surgery in patients undergoing risk-reducing mastectomy and immediate implant based reconstruction, we have developed a prospective pilot study to evaluate postoperative outcomes, patient satisfaction and length of hospital stay. The study aims to explore a proposed day case pathway for patients undergoing risk reducing mastectomy (RRM) and IBR, with the concurrent use of regional anaesthesia including paravertebral and pectoral PEC I nerve blocks. In the pathway protocol, paravertebral blocks at the T4 level and PEC I blocks are administered to provide postoperative analgesia.

Protocol:

Pre-operatively, patients have a one to one consultation with their surgeon, breast clinical nurse specialist and consultant anaesthetist. During these appointments patients will be educated about day case surgery, our specific pathway and what to expect. Nursing staff within theatre admissions and recovery have also been educated in how to assist patients during their day case journey. In the immediate post-operative period, a modified recovery pathway will be used. The aim of the protocol, using total intravenous anaesthesia (TIVA), ultra short acting opioids and blocks, is to reduce length of stay in the post anaesthesia care unit (PACU) and to return patients to the Day

Unit to mobilise early; eat and drink immediately and be observed for any immediate postoperative complication before planned discharge at 6 hours post operation. To allow sufficient time for six hours of observed, modified recovery, the patients will be prioritised and scheduled first on the operating list. Standard surgical techniques will be followed. All patients will be seen by the consultant surgeon and consultant anaesthetist prior to discharge, and telephoned the day after surgery by the operating surgeon. The protocol includes a video call using the secure Trust software used for online remote outpatient clinics and allows an opportunity to educate, reassure, and to view wounds and drains online.

Conclusion:

We hope our pathway will deliver safe and effective care, with high levels of patient satisfaction, alleviating the pressures facing delayed elective surgeries in the NHS during COVID-19. The prospective nature of this study will allow us to use verified questionnaires (BREAST-Q) to gather an insight into the direct psychosocial impact on patients, alongside complications, recovery and overall outcomes. Clinical and psychological data from this pilot study will be evaluated and published.

Declarations:

Ethics: Ethical approval for the pilot study was approved by the local ethics committee of Sheffield Teaching Hospital NHS Trust.

Consent for publication: All patients involved have given consent for the data to be anonymously collected and stored confidentially.

Conflicts of interest: There are no conflicts of interest.

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