

Results: Only 62% (n=62/100) of referrals included information on aspirate. 93% (n=93/100) of NGT check x-rays included the NGT tip. Line enhancement software tools were used in 94% (n=94/100) of cases. Examinations were reported by radiology within agreed timescales in 97% (n=97/100) of cases but the report was acknowledged by the referring clinician prior to feeding for 32% (n=16/50) of examinations. No NGT Never Events had been reported since implementation. However clinicians had raised concerns regarding out-of-hours reporting delays.

Conclusion: Radiology reporting of NGT check x-rays was implemented to improve patient safety. Further work is required to improve referrer compliance with requirements for stating aspirate on requests and acknowledgement of radiology reports prior to feeding. Availability of out-of-hours reports presents an additional challenge.

1. NHS England 2022, *Provisional publication of never events reported as occurring between 1 April 2021 published and 31 March 2022*. NHS England, London.

D5.5 Reducing never events associated with nasogastric tubes: a radiographer led initiative

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Background: The Healthcare Safety Investigation Branch (2020) examined patient safety issues related to the placement of naso-gastric (NG) tubes. Several recommendations were proposed to reduce associated adverse events; such as, providing a timely report on the position of NG tubes on chest x-rays. Gill et al. (2017) conducted a successful trial of Radiographer reporting of NG tubes. Therefore, the aim of this study was to assess the safe transferability of Radiographer reporting of NG tubes to another trust.

Method: A prospective data analysis was conducted of 508 chest x-rays and reports for NG tube checks over 6-months. Accuracy of Radiographer reports were compared to reference standard Consultant Radiologists. Chest x-rays were also audited for potentially significant (none tube related) chest pathology.

Results: From 508 cases, the accuracy of Radiographer reporting was 98.6% (95% confidence interval [CI]: 97.2 - 99.4), sensitivity 98.9% (95% CI: 93.8 - 100), specificity 98.6% (95% CI: 96.9 - 99.5), positive predictive value 93.5% (95% CI: 86.8 - 97), and negative predictive value 99.8% (95% CI: 98.3 - 100). 7 (1.4%) minor discrepancies and no major discrepancies were identified. 6 cases (1.2%) had potentially significant (extra-tube) findings (4 heart failure, 1 infection and 1 pneumothorax) that had not been imaged before.

Conclusion: Radiographer immediate reporting of NG tubes on chest x-rays provides an accurate reporting service to improve patient safety by reducing the risk of intra-pulmonary feeding. There was a low occurrence of potentially significant (none tube related) chest pathology findings, however it is unclear if these were clinically new findings.

1. Healthcare Safety Investigation Branch. (2020) Placement of nasogastric tubes. Retrieved from: <https://www.hsib.org.uk/investigations-and-reports/placement-of-nasogastric-tubes/placement-of-nasogastric-tubes/>

2. Roe, G., Harris, K. M., Lambie, H. and Tolan, D. J. M. (2017) Radiographer workforce role expansion to improve patient safety related to nasogastric tube placement for feeding in adults. *Clinical Radiology*, 72(6), pp.518-e1.



Proffered papers: Pregnancy

E9.1 Hiding in plain sight - a case report on a heterotopic twin pregnancy

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Background: Ruptured ectopic pregnancy (REP) and Ruptured corpus luteal cyst (RCLC) are two of the most frequent acute gynaecological emergencies, presenting with abdominal pain and haemoperitoneum. Heterotopic pregnancy (HP) is where there are multiple gestations (an intrauterine and extra-uterine location, i.e. an ectopic pregnancy). Whilst rare spontaneously (1 in 30,000), due to modern advances HP is now thought to have a common prevalence in those undergoing assisted reproduction techniques (1 in 100).¹

Purpose: We present a rare case of a 7 week twin heterotopic pregnancy with normal antenatal scans and diagnostic uncertainty, with an initial diagnosis of RCLC on CT. We utilise this case to explain possible distinguishing imaging features on US and CT between these two conditions; and as an example of the increasing prevalence of HP in those undergoing IVF.

Summary : Diagnosing HP on imaging can be challenging, given that diagnosing REP relies on the lack of an intrauterine pregnancy and positive beta-HCG. Given the increasing prevalence of HP, this should be the principal diagnosis to consider and exclude in those who have undergone IVF. If an adnexal lesion is identified, REP and RCLC can be difficult to differentiate due to similar imaging features and are commonly misdiagnosed. Despite similar presentation, the management varies as REP often necessitates surgical treatment, whilst RCLC can usually be managed conservatively. Thus being able to differentiate between these conditions is vital for the imaging specialist to aid effective patient care.

1. Maleki, A. et al. (2021) The rising incidence of heterotopic pregnancy: Current perspectives and associations with in-vitro fertilization, *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 266, pp. 138-144. Available at: <https://doi.org/10.1016/j.ejogrb.2021.09.031>.

E9.2 Offering post-mortem imaging as an alternative to conventional autopsy: Single centre experience of changes in parental choice

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Background: Autopsy can provide parents with answers as to why their pregnancy ended. However, many parents decline this option due to the invasive nature of conventional autopsy (CA). Less-invasive autopsy (LIA) techniques, using medical imaging, provide parents with a more acceptable method of investigation, with high diagnostic accuracy when compared to CA. Micro-CT has recently been adopted within our centre as a non-invasive, high-resolution post-mortem imaging technique, providing an alternative for parents who decline CA. We examined the impact of integrating micro-CT into our clinical service on parental choice.

Method: We retrospectively analysed perinatal autopsy referrals to our institution across two different years. Parental consent and different types of autopsy performed were recorded. Chi squared statistical test was used to test proportions.

Results: Between 2019 and 2021 the number of parents who only consented to minimally-invasive autopsy techniques when offered showed a statistically significant increase from 14% (59/428;2019) to 28% (109/390;2021), $p < 0.00001$. There was statistically significant reduction in CA from 204/428 (48%; 2019) to 107/290 (27%; 2021), $p = 0.0043$ was very statistically significant. There was also a statistically significant increase in cross-sectional imaging from 55% (237/428;2019) to 81% (251/309;2021) $p < 0.0001$, demonstrating an increased reliance on post-mortem imaging in a modern autopsy delivery service.

Conclusion: Our study shows that increased availability of LIA reduces demand for CA. Providing greater choice for parents allows individualised care pathways to be chosen that better suit the family's needs. Raised awareness and availability will provide benefit for parents and clinicians alike.

E9.3 The influence of antenatal imaging on parent-fetal bonding

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Background: The emotional connection that expectant parents form to their unborn child is important for healthy fetal and infant brain development and parental wellbeing. Imaging during pregnancy is thought to facilitate the developing parent-fetal bond, however the factors which may influence this are not well understood (Skelton et al., 2022). This study aimed to identify parental and scan variables which may predict increased bonding after antenatal imaging.

Method: Expectant parents (mothers=58, fathers=18) attending a single site for obstetric ultrasound (n=64) or fetal magnetic resonance imaging as part of an existing research study (n=12) completed an online questionnaire (QualtricsXM) before and after their scans. Gestational age at imaging was between 18-36 weeks of pregnancy, and parents were invited to share their expectations and experiences of the scans. A modified version of Muller's Prenatal Attachment Inventory was used to measure prenatal bonding. Multivariate linear regression with bootstrapping was used to test if demographic information and scan variables significantly predicted bonding after antenatal imaging.

Results: Mean bonding was significantly ($p < 0.05$) increased after imaging for mothers ($t = 6.11$) and fathers ($t = 2.29$) irrespective of imaging modality. The final regression model was significant and included nine variables (adjusted $R^2 = 0.33$, $F = 4.86$, $p < 0.001$). Of these, modality type ($= 0.45$, $p = 0.04$), parental experience ($= 0.36$, $p = 0.07$), parental excitement ($= 0.31$, $p = 0.01$) and employment status ($= 0.25$, $p = 0.02$) were significantly associated with increased bonding scores after imaging.

Conclusion: Radiographers and sonographers in antenatal imaging are uniquely positioned to facilitate positive experiences through the provision of parent-centred care, which may enhance parental excitement and support the developing parent-fetal bond.

1. Skelton, E, Webb, R, Malamateniou, C, Rutherford, M. and Ayers, S. (2022) The impact of antenatal imaging on parent experience and prenatal attachment: a systematic review. *J Reprod Infant Psychol*. DOI: 10.1080/02646838.2022.2088710

E9.4 A qualitative exploration of UK obstetric sonographers' experiences of the COVID-19 pandemic

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Background: Substantial changes were made to the provision of pregnancy ultrasound services during the COVID-19 pandemic to minimise virus transmission and maintain service continuity (Skelton et al., 2023). Literature describing the impact of the pandemic on obstetric sonographers is predominantly quantitative in nature, however statistics cannot fully convey sonographers' voices. This study aimed to gain a deeper understanding of the experiences of UK obstetric sonographers performing pregnancy ultrasound scans during the pandemic.

Method: A UK-wide, online, anonymous cross-sectional survey on QualtricsXM was open to responses between 9th March and 6th May 2021. Open questions were included to capture qualitative detail from respondents about their perceptions and experiences of scanning during the pandemic. Themes were generated from free text responses using thematic analysis.

Method: Written responses were received from 111 sonographers. Five themes were generated, depicting the impact of the pandemic on obstetric sonographers: 1) continuity in a crisis; 2) decisions about me, without me; 3) battle scars - the lasting damage of COVID-19; 4) what people think I do vs. what I really do; and 5) the human touch. A cross-cutting theme was sonographers' feelings of disconnection from senior figures and expectant parents which created a sense of abandonment and distrust.

Conclusion: Self-reported experiences of ineffective leadership and management, and perceived lack of understanding of the sonographer's role are potential contributory factors in the high levels of moral injury and occupational burnout reported within the workforce. Moral injury support and healing must be prioritised to enable post-pandemic recovery of the obstetric ultrasound workforce.

1. Skelton, E., Harrison, G., Rutherford, M., Ayers, S. and Malamateniou, C. (2023) UK obstetric sonographers' experiences of the COVID-19 pandemic: Burnout, role satisfaction and impact on clinical practice. *Ultrasound*. 31(1), 12-22.

E9.5 Prenatal diagnosis of tracheo-oesophageal fistula/oesophageal atresia: is MRI helpful?

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Background: Oesophageal atresia (OA) with or without tracheo-oesophageal fistula (TOF) affects 2.75 per 10,000 births within the UK [1]. Studies have shown fetal magnetic resonance imaging (MRI) has a greater diagnostic accuracy than ultrasound [2], however there remains uncertainty over what size constitutes a small stomach and how frequently this correlates with a diagnosis of TOF/OA.

Method: A study of all patients referred to our centre for fetal MRI due to suspicions of TOF/OA on antenatal ultrasound between October 2011 and October 2022 was undertaken. The indication, MRI findings and postnatal outcome were then compared to assess diagnostic accuracy. Particular focus was on the size of the stomach seen on MRI.

Method: 52 patients had an MRI result suspicious of TOF/OA. 46 of these had been referred for MRI to exclude TOF/OA following ultrasound. 6 had MRI for different indication but a diagnosis of possible TOF/OA was made following the MRI (3/6 of these had TOF/OA). TOF/OA was suspected on 29/35 MRI scans of which 16 had TOF/OA (positive predictive value 55.2%). 6 MRI scans were reported as normal and none of these patients had TOF/OA (negative predictive value 100%). The stomach bubble was absent in 6 cases of which 5 had TOF/OA and only a sliver of stomach was seen in 2 cases which both had TOF/OA diagnosed postnatally.

Conclusion: Fetal MRI can accurately exclude TOF/OA and has improved diagnostic accuracy when compared with ultrasound alone.

1. Prevalence charts and tables. 24 Aug 2018 [cited 8 Feb 2023]. Available: https://eu-rd-platform.jrc.ec.europa.eu/eurocat/eurocat-data/prevalence_en_2. Pardy C, D'Antonio F, Khalil A, Giuliani S. Prenatal detection of esophageal atresia: A systematic review and meta-analysis. *Acta Obstet Gynecol Scand*. 2019;98: 689-699.