Current standards for assessing pregnancy status before surgery are subjective and should be replaced with definitive, objective evidence

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Title: Current standards for assessing pregnancy status before surgery are subjective and should be re-placed with definitive, objective evidence

Short title: Assessment of pregnancy status before surgery

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Abstract:

We report a case of a young woman admitted electively for laparoscopic Nissen fundoplication, and again three days post-operatively as an emergency with profuse vomiting and abdominal pain. She underwent diagnostic laparoscopy, and a small gastric perforation was found at the site of the fundoplication and was suture-repaired. On both admissions she was “screened” for pregnancy as per current guidelines. On the second admission, following a CT scan she was found to have a gravid uterus with a foetus of 16-18 weeks gestation. In the opinion of the authors, this case highlights that current NICE guidelines may be insufficient, and could lead to unnecessary harm either to mother or foetus pre, peri, or post-operatively.

Keywords: pregnancy test, preoperative procedures

Introduction

In 2013-14 in England, there were 4.7 million surgical admissions. More than a million of these patients were females of reproductive age. This cohort therefore represents a significant proportion of individuals admitted electively or acutely to surgical units { ADDIN EN.CITE <EndNote><Cite><Year>2015</Year><RecNum>74</RecNum><DisplayText>(1)</DisplayText><record><rec-number>74</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1502057816">74</key></foreign-keys><ref-type name="Generic">13</ref-type><contributors></contributors><titles><title>Health and Social Care Information Centre</title><secondary-title>Hospital Episode Statistics: admitted patient care 2013 to 2014</secondary-title></titles><dates><year>2015</year></dates><urls><related-urls><url>https://www.gov.uk/government/statistics/hospital-episode-statistics-admitted-patient-care-2013-to-2014</url></related-urls></urls></record></Cite></EndNote>}. Along with initial observations and standard investigations, it is important to take a full gynaecological history and to consider pregnancy testing in order to assess the possibility of pregnancy. Current NICE guidelines recommend pregnancy testing prior to elective surgery only when the patient indicates on questioning that she may be pregnant { ADDIN EN.CITE <EndNote><Cite><Year>2003</Year><RecNum>25</RecNum><DisplayText>(2

)</DisplayText><record><rec-number>25</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1407849139">25</key></foreign-keys><ref-type name="Generic">13</ref-type><contributors></contributors><titles><title>National Institute for Health and Care Excellence.</title><secondary-title>Preoperative tests: the use of routine preoperative tests for elective surgery.</secondary-title></titles><dates><year>2003</year></dates><publisher>NICE</publisher><urls></urls></record></Cite></EndNote>}. There are no guidelines for emergency admissions. In this case report, we highlight a scenario in which the current guidelines were followed and an unknown pregnancy was subsequently missed.

Case presentation

A fit and well 30 year old female (BMI 29.3) with polycystic ovarian syndrome was admitted for elective laparoscopic Nissen fundoplication for gastro-oesophageal reflux disease. Questioning regarding the possibility of pregnancy took place during anaesthetic pre-assessment and on the day of surgery, in accordance with NICE guidelines. On both occasions, she indicated no possibility of pregnancy.

Fundoplication was uncomplicated, resulting in a loose, well positioned wrap. The patient was discharged the following day when tolerating free fluids and soft diet.

Three days post-procedure she was readmitted with vomiting and upper abdominal pain for the preceding 12 hours. Examination demonstrated a non-distended abdomen, which was tender in the epigastrium but not peritonitic. Again, no pregnancy test was performed as the patient advised there was no possibility of pregnancy.

CT of abdomen and pelvis was suspicious for gastric perforation, but also showed a gravid uterus with fetus consistent with a 16 -18 week pregnancy (Image 1). The patient underwent diagnostic laparoscopy. One of the stitches holding the fundal wrap had “cut out” causing a small gastric perforation. The wrap was otherwise intact. Following laparoscopic washout and suture repair of the defect her further recovery was uneventful. Her management was discussed with the obstetric team as soon as the pregnancy was detected. She underwent routine antenatal care and delivered a healthy infant.

Discussion

Failing to document pregnancy status in a female presenting for elective or emergency surgical assessment can have significant consequences. Some anaesthetic agents are potentially teratogenic and may be associated with abortive effects on foetuses { ADDIN EN.CITE <EndNote><Cite><Author>Reitman</Author><Year>2011</Year><RecNum>56</RecNum><DisplayText>(3)</DisplayText><record><rec-number>56</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1468807896">56</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Reitman, E.</author><author>Flood, P.</author></authors></contributors><auth-address>Department of Anesthesiology, Columbia University, New York, NY 10032, USA.</auth-address><titles><title>Anaesthetic considerations for non-obstetric surgery during pregnancy</title><secondary-title>British journal of anaesthesia</secondary-title><alt-title>Br J Anaesth</alt-title></titles><periodical><full-title>Br J Anaesth</full-title><abbr-1>British journal of anaesthesia</abbr-1></periodical><alt-periodical><full-title>Br J Anaesth</full-title><abbr-1>British journal of anaesthesia</abbr-1></alt-periodical><pages>i72-8</pages><volume>107 Suppl 1</volume><keywords><keyword>Anesthesia, Conduction</keyword><keyword>Anesthesia,

General</keyword><keyword>Female</keyword><keyword>Fetal Hypoxia</keyword><keyword>Fetal Monitoring</keyword><keyword>Humans</keyword><keyword>Pregnancy</keyword><keyword>Pregnancy Complications</keyword><keyword>chemically induced</keyword><keyword>methods</keyword><keyword>surgery</keyword></keywords><dates><year>2011</year></dates><accession-num>Medline:22156272</accession-num><urls><related-urls><url><Go to ISI>://MEDLINE:22156272</url></related-urls></urls><language>English</language></record></Cite></EndNote>}.
Although the radiation levels of most diagnostic procedures are insufficient to cause major foetal malformation, the possibility of such malformation is a common source of anxiety for the patient and family { ADDIN EN.CITE <EndNote><Cite><Author>Lowe</Author><Year>2004</Year><RecNum>58</RecNum><DisplayText>(4)</DisplayText><record><rec-number>58</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1468807990">58</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Lowe, Sandra A.</author></authors></contributors><auth-address>Department of Medicine, Royal Hospital for Women, New South Wales, Randwick, Sydney, Australia. s.lowe@unsw.edu.au</auth-address><titles><title>Diagnostic radiography in pregnancy: risks and reality</title><secondary-title>The Australian & New

Zealand journal of obstetrics & gynaecology</secondary-title><alt-title>Aust N Z J Obstet Gynaecol</alt-title></titles><periodical><full-title>Aust N Z J Obstet Gynaecol</full-title><abbr-1>The Australian & New Zealand journal of obstetrics & gynaecology</abbr-1></periodical><alt-periodical><full-title>Aust N Z J Obstet Gynaecol</full-title><abbr-1>The Australian & New Zealand journal of obstetrics & gynaecology</abbr-1></alt-periodical><pages>191-6</pages><volume>44</volume><number>3</number><keywords><keyword>Female</keyword><keyword>Fetus</keyword><keyword>Fluoroscopy</keyword><keyword>Humans</keyword><keyword>Pregnancy</keyword><keyword>Radiation Dosage</keyword><keyword>Radiography</keyword><keyword>Risk Factors</keyword><keyword>Tomography, X-Ray Computed</keyword><keyword>radiation effects</keyword><keyword>adverse effects</keyword><keyword>radiation effects</keyword><keyword>adverse effects</keyword><keyword>adverse effects</keyword></keywords><dates><year>2004</year></dates><isbn>0004-8666</isbn><accession-num>Medline:15191441</accession-num><urls><related-urls><url><Go to ISI>://MEDLINE:15191441</url></related-urls></urls><language>English</language></record></Cite></EndNote>}. The patient in this case underwent two general anaesthetics as well as a CT scan over the course of her two admissions, thereby submitting both the patient and foetus to potential unnecessary harm. The patient was in the second trimester of pregnancy

where the risks include congenital malformations, growth and mental retardation, sterility, cataracts and malignancy { ADDIN EN.CITE { ADDIN EN.CITE.DATA }}. The risks posed in the first trimester are even greater { ADDIN EN.CITE { ADDIN EN.CITE.DATA }}. By questioning the patient regarding the possibility of pregnancy (as per guidelines), the process is entirely subjective, whereas objective evidence of pregnancy status would be much more accurate. If objective evidence of pregnancy status had been obtained on the first admission then an informed discussion about the risks and benefits of proceeding with the planned surgery could have taken place. It is likely that her surgery would have been postponed until the post partum period.

Current NICE guidelines recommend pregnancy testing only when the patient indicates on questioning that she may be pregnant { ADDIN EN.CITE <EndNote><Cite><Year>2003</Year><RecNum>25</RecNum><DisplayText>(2)</DisplayText><record><rec-number>25</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1407849139">25</key></foreign-keys><ref-type name="Generic">13</ref-type><contributors></contributors><titles><title>National Institute for Health and Care Excellence.</title><secondary-title>Preoperative tests: the use of routine preoperative tests for elective surgery.</secondary-title></titles><dates><year>2003</year></dates><publisher>NICE</publisher><urls></urls></record></Cite></EndNote>}. This case highlights a scenario where

the current guidelines for elective surgery may miss a pregnancy, and a lack of emergency guidelines may produce a similar outcome. We would advocate objective determination of pregnancy status in all females of reproductive age admitted to hospital, either electively or as an emergency, prior to any procedure requiring a general anaesthetic or exposure to ionising radiation, There are a number of ethical factors to consider prior to the implementation of mandatory pregnancy in this cohort. However, clinicians are also duty bound by the General Medical Council's code of practice to ensure patient safety is not compromised {ADDIN EN.CITE <EndNote><Cite><Year>2013</Year><RecNum>43</RecNum><DisplayText>(6)</DisplayText><record><rec-number>43</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1435171519">43</key></foreign-keys><ref-type name="Report">27</ref-type><contributors></contributors><titles><title>General Medical Council. Good Medical Practice</title></titles><dates><year>2013</year></dates><pub-location>London, UK</pub-location><publisher>GMC</publisher><urls></urls></record></Cite></EndNote>}. We believe that objective evidence of pregnancy status should be obtained by means of formal pregnancy testing using either serum or urine Beta Human Chorionic Gonadotropin, in order to prevent inadvertent harm to patients.

A Scottish multicentre prospective audit { ADDIN EN.CITE <EndNote><Cite><Author>Wilson</Author><Year>2017</Year><RecNum>72</RecNum><DisplayText>(7)</DisplayText><record><rec-number>72</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1502037272">72</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Wilson, M. S. J.</author><author>Powell-Bowns, M.</author><author>Robertson, A. G.</author><author>Luhmann, A.</author><author>Richards, C. H.</author><author>Scottish Surgical Research, Group</author></authors></contributors><auth-address>Department of General Surgery, NHS Tayside, Ninewells Hospital, Dundee, UK.
Department of Trauma and Orthopaedics, NHS Lothian, Edinburgh, UK.
Department of General Surgery, NHS Grampian, Aberdeen, UK.</auth-address><titles><title>National multicentre audit of pregnancy status in general surgery admissions in Scotland</title><secondary-title>Postgrad Med J</secondary-title></titles><periodical><full-title>Postgrad Med J</full-title></periodical><pages>480-483</pages><volume>93</volume><number>1102</number><keywords><keyword>general surgery</keyword><keyword>patient safety</keyword><keyword>pregnancy test</keyword></keywords><dates><year>2017</year><pub-

dates><date>Aug</date></pub-dates></dates><isbn>1469-0756 (Electronic)
0032-5473 (Linking)</isbn><accession-num>28096306</accession-num><urls><related-urls><url>https://www.ncbi.nlm.nih.gov/pubmed/28096306</url></related-urls></urls><electronic-resource-num>10.1136/postgradmedj-2016-134390</electronic-resource-num></record></Cite></EndNote>} of females of reproductive age under the care of general surgery reported in 2017 that of 530 patients, only 274 (51.7%) had a documented pregnancy status. Just 211 of 318 (65.1%) emergency patients presenting with abdominal pain, and 52 of 169 (30.8%) elective cases had a documented pregnancy status. The study concluded that poor documentation of pregnancy status was commonplace, and that guidelines should be changed to encompass both emergency and elective patients. Furthermore, the authors suggested that objective evidence of pregnancy status should be electronically stored as is the case with other blood tests and results of radiological investigations.

The National Patient Safety Agency between 2003 and 2009 received 42 reports of NHS elective surgical patients undergoing procedures without a documented pregnancy test result, who were subsequently found to be pregnant { ADDIN EN.CITE <EndNote><Cite><Year>2010</Year><RecNum>24</RecNum><DisplayText>(8)</DisplayText><record><rec-number>24</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw"

timestamp="1407847833">24</key></foreign-keys><ref-type name="Generic">13</ref-type><contributors></contributors><titles><title>Rapid Response Report NPSA/2010/RRR011</title><secondary-title>Checking pregnancy before surgery.</secondary-title></titles><dates><year>2010</year></dates><pub-location>London</pub-location><publisher>National Patient Safety Agency</publisher><urls></urls></record></Cite></EndNote>}. Of these, three (7.1%) subsequently spontaneously aborted. This is likely to be a significant underestimate of the true scale of the problem.

Numerous studies have reported the incidence of unknown pregnancy in females of reproductive age presenting for elective surgery, ranging from 0 to 2.7% { ADDIN EN.CITE { ADDIN EN.CITE.DATA }}. Whether presenting electively, or as an emergency, the patient may be unaware they are pregnant, particularly if they have not yet missed their expected menstrual period { ADDIN EN.CITE <EndNote><Cite><Author>Wingfield</Author><Year>2014</Year><RecNum>26</RecNum><DisplayText>(13)</DisplayText><record><rec-number>26</rec-number><foreign-keys><key app="EN" db-id="p2fzwf9wb9ptd9eeev5prw9eps0xz5rp2xrw" timestamp="1413237112">26</key></foreign-keys><ref-type name="Journal Article">17</ref-type><contributors><authors><author>Wingfield, M.</author><author>McMenamin, M.</author></authors></contributors><auth-address>Merrion Fertility Clinic, National Maternity Hospital, Holles Street,

Dublin 2, Ireland.</auth-address><titles><title>Preoperative pregnancy testing</title><secondary-title>Br J Surg</secondary-title><alt-title>The British journal of surgery</alt-title></titles><periodical><full-title>Br J Surg</full-title><abbr-1>The British journal of surgery</abbr-1></periodical><alt-periodical><full-title>Br J Surg</full-title><abbr-1>The British journal of surgery</abbr-1></alt-periodical><pages>1488-90</pages><volume>101</volume><number>12</number><dates><year>2014</year><pub-dates><date>Nov</date></pub-dates></dates><isbn>1365-2168 (Electronic)
0007-1323 (Linking)</isbn><accession-num>25209586</accession-num><urls><related-urls><url>http://www.ncbi.nlm.nih.gov/pubmed/25209586</url></related-urls></urls><electronic-resource-num>10.1002/bjs.9637</electronic-resource-num></record></Cite></EndNote>}.

Conclusions:

- Current NICE guidelines for elective surgery recommend pregnancy testing only when the patient indicates on questioning that they may be pregnant.
- There are no guidelines for emergency surgery.
- Current guidelines can miss an unknown pregnancy. Objective documentation of pregnancy status prior to a general anaesthetic or exposure to ionising radiation will minimise the risks to the patient and foetus.

In this case report, we have demonstrated that current guidelines appear unfit for purpose and may lead to unnecessary harm either to mother or foetus pre, peri, or

post-operatively. As a consequence, our local guidelines have changed. In women of child-bearing age (12-55) we seek consent to objective pregnancy testing prior to elective and emergency surgery requiring a general anaesthetic. This is further verified as part of the preoperative theatre checklist. We strongly recommend that the same changes be made on a national level.

Competing interests: None

Authors contributions: KDC sought information about the case via electronic records, and drafted the case presentation; AL, MW and PP contributed to all sections. All authors revised the article critically for intellectual content and approved the manuscript for publication.

Patient Consent: Consent has been given from the patient for publication of this case

Figures:

Figure 1: Abdominal CT scan taken on readmission to hospital post surgery. Visible gravid uterus..

References

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