Volume 13, Issue 3 ▪ 2022

CJMS

Canadian Journal of Medical Sonography

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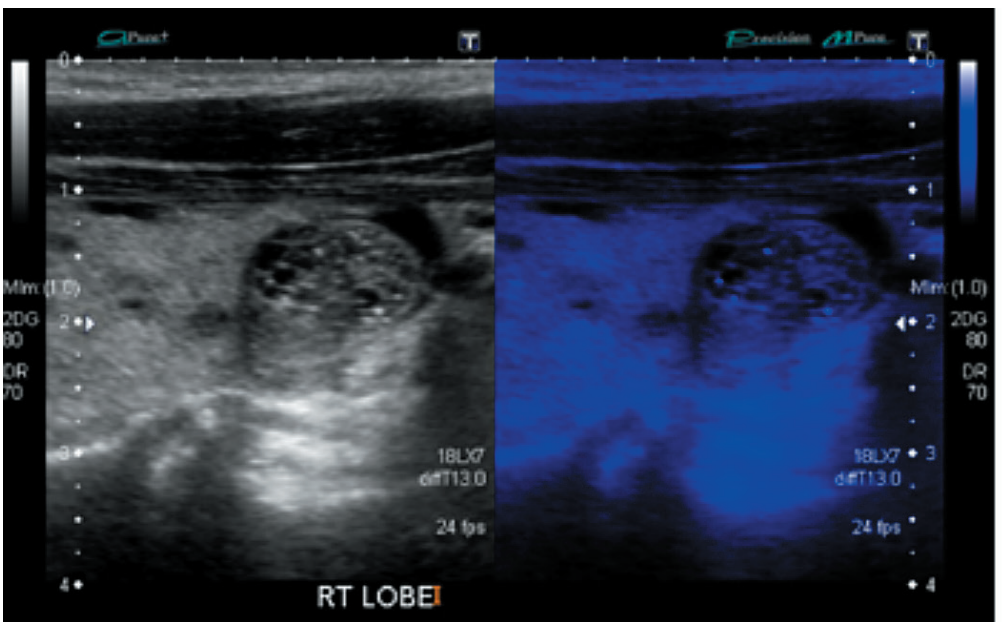

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Volume 13, Issue 3 • 2022

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About the cover

MicroPure Imaging Technology to Image the Thyroid in a University Tertiary Referral Centre. Megan Britto, BMRSc, DMS, CRGS Karen Strike, BKin Hons, MScPT John Donnellan, MB, BCh, BAO, MSc, MMedSci, FFRRCSI Nina Stein, MD, MSc, FRCPC Figure 1. (B) B-mode & MicroPure image

Message from the Editor-in-Chief

Here comes the fall! We have had a spectacular autumn season in Ontario, and the North's colors are striking. I'm not sure I'm ready for winter yet, but ready or not, it will come. For those crisp, beautiful fall days, our authors, editors, and reviewers are offering an interesting CJMS journal that will go well with a cup of tea/coffee, maybe with a splash of something, and some cookies.

Featured in Volume 13, issue 3 of the CJMS is Jia Qian Lu from Sunnybrook Hospital in Toronto. She has shared a very fascinating and rare finding of a case of a live dichorionic diamniotic twin tubal ectopic pregnancy. She has also documented this patient's surgical findings, treatment, and management which is important information that is not always available to the sonographer. Can you feel the excitement when you can recognise and document such a rare finding?

Speaking of findings, a team of interprofessional healthcare and research professionals from the Credit Valley Diagnostic Centre in Mississauga Ontario, as well as the McMaster Children's Hospital & Hamilton Health Sciences in Hamilton, Ontario collaborated and conducted a retrospective chart review to evaluate the use of MicroPure in cases of thyroid imaging. Their study of a small sample size led them to conclude that further studies with a larger sample size, and real-time ultrasound scans with just one or two trained sonographers are needed to better understand and develop a protocol concerning the use of MicroPure in the ultrasound examination of the thyroid.

Nina Romanova is a sonographer at Canada Diagnostic Centres based in Calgary, Alberta. This issue features her case report which consists of comparing two cases that both demonstrated similar solid echogenic masses in the breast, with different clinical histories. Both patients had mammograms and biopsies, and the results on these two solid echogenic masses were quite dissimilar. One was benign, and the other malignant. I really appreciated Nina's tenacity in getting these cases published. There were many iterations but our readers can now benefit from her efforts and the final product.

Happy Thanksgiving to all Canadian sonographers. As I wind up my second and final term as Editor-in-Chief of the CJMS, I wish to express my gratitude to the editorial team and all content contributors during my time in this role. This professional publication is essential to promoting the advancement of our profession, so please take the time to share your findings and lessons learned with your fellow sonographers.

We look forward to your manuscript submissions.

Sheena Bhimji-Hewitt

Broadening Horizons & Pushing Boundaries

*The opinion in this editorial is that of the Editor-in-Chief and not that of Sonography Canada or the Sonography Board of Directors.

Message de la rédactrice en chef

L'automne arrive ! Nous avons eu un automne spectaculaire en Ontario, et les couleurs du Nord sont saisissantes. Je ne suis pas sûre d'être encore prête pour l'hiver, mais prête ou non, il viendra. Pour ces belles journées d'automne, nos auteurs, rédacteurs et réviseurs vous proposent une revue intéressante de la CJMS qui se mariera bien avec une tasse de thé ou de café, peut-être avec une touche de quelque chose, et quelques biscuits.

Dans le volume 13, numéro 3 de la CJMS, nous vous présentons Jia Qian Lu de l'hôpital Sunnybrook à Toronto. Elle nous a fait part d'un cas très fascinant et rare de grossesse extra-utérine tubaire de jumeaux diamniotiques dichorioniques vivants. Elle a également documenté les résultats chirurgicaux, le traitement et la prise en charge de cette patiente, ce qui constitue une information importante qui n'est pas toujours disponible pour l'échographiste. Pouvez-vous sentir l'excitation quand vous pouvez reconnaître et documenter une découverte aussi rare ?

En parlant de résultats, une équipe interprofessionnelle de professionnels de la santé et de la recherche du Credit Valley Diagnostic Centre à Mississauga (Ontario), ainsi que du McMaster Children's Hospital & Hamilton Health Sciences à Hamilton (Ontario), a collaboré et mené une étude rétrospective des dossiers pour évaluer l'utilisation de MicroPure dans les cas d'imagerie de la thyroïde. Leur étude portant sur un petit échantillon les a amenés à conclure que d'autres études portant sur un échantillon plus important et des échographies en temps réel avec seulement un ou deux échographistes formés sont nécessaires pour mieux comprendre et développer un protocole concernant l'utilisation de MicroPure dans l'examen échographique de la thyroïde.

Nina Romanova est échographiste au Canada Diagnostic Centres, à Calgary, en Alberta. Ce numéro présente son rapport de cas qui consiste à comparer deux cas qui présentaient tous deux des masses solides échogènes similaires dans le sein, avec des antécédents cliniques différents. Les deux patientes ont subi des mammographies et des biopsies, et les résultats de ces deux masses solides échogènes étaient très différents. L'une était bénigne, et l'autre maligne. J'ai vraiment apprécié la ténacité de Nina pour faire publier ces cas. Il y a eu de nombreuses itérations, mais nos lecteurs peuvent maintenant bénéficier de ses efforts et du produit final.

Joyeuse Action de grâce à tous les échographistes canadiens. Alors que je termine mon deuxième et dernier mandat en tant que rédacteur en chef de la CJMS, je souhaite exprimer ma gratitude à l'équipe de rédaction et à tous les collaborateurs au contenu pendant mon mandat. Cette publication professionnelle est essentielle pour promouvoir l'avancement de notre profession, alors prenez le temps de partager vos découvertes et les leçons apprises avec vos collègues échographistes.

Nous attendons avec impatience vos soumissions de manuscrits.

Sheena Bhimji-Hewitt

Élargir les horizons et repousser

*L'opinion exprimée dans cet éditorial est celle du rédacteur en chef et non celle de Sonographie Canada ou du conseil d'administration de Sonographie.

Case Report

Jia Qian Lu BMRSc, DMS, CRGS, RDMS

A Rare Case of a Live Dichorionic Diamniotic Twin Tubal Ectopic Pregnancy

About the Author

Jia Qian Lu is a Generalist Sonographer and works at the Breast Cancer Centre at Sunnybrook Health Sciences Centre in Toronto, Ontario. She has a bachelor's degree in Medical Radiation Sciences from McMaster University and an Advanced Diploma in Ultrasonography from Mohawk College. She also has certificates in Clinical Education and Leadership in Health Care from the Michener Institute of Education at UHN.

Corresponding author: Jia Qian Lu: jiaqianamylu@hotmail.com

ABSTRACT

The incidence of live, twin tubal ectopic pregnancies is extremely rare, occurring in 1 in 125,000 pregnancies. This case report describes the clinical manifestation, clinical history, and ultrasound findings of a 39-year-old female with no known significant risk factors for an ectopic pregnancy but was diagnosed by ultrasound imaging with a live, twin, tubal ectopic at a gestational age of 5 weeks, 5 days. This case report also documents the patients' management and treatment provided.

Keywords: Live twin ectopic, Twin tubal ectopic pregnancy, Hemoperitoneum, Ruptured fallopian tube, Dichorionic diamniotic, Sonography, and Ultrasound

Introduction

An ectopic pregnancy is a fertilized ovum that implants outside the endometrial cavity of the uterus.[1] Ectopic pregnancy accounts for approximately 2% of all reported pregnancies.[1] Twin tubal ectopic pregnancies are rare, occurring at an incidence of 1 in 200 ectopic pregnancies.[2] Live twin ectopic pregnancy is even rarer, occurring in 1 in 125,000 pregnancies.[2] The risk factors for ectopic pregnancy includes a history of previous ectopic pregnancy, fallopian tube surgery, prior abdominal or pelvic surgery, certain sexually transmitted infections (STIs), pelvic inflammatory disease (PID), endometriosis, cigarette smoking, increased maternal age (over 35 years of age), history of infertility and use of assisted reproductive technology or fertility therapies.[2] Ninety percent of ectopic pregnancies occur in the fallopian tubes and 10% in the abdomen, cervix, ovary, and cesarean scar.[2] This case report describes a live twin tubal ectopic pregnancy at a gestational age of 5 weeks, 5 days.

Case Description

A 39-year-old female, gravida 6, para 2, spontaneous abortions 2, medical termination 1 presented to her gynecologist's office with focal left

lower quadrant (LLQ) pain that started the previous night. The patient's surgical history included appendectomy, two caesarian sections, and dilation and curettage (D&C) for a medical termination. Based on the first day of her last normal menstrual period (LNMP), the pregnancy was dated at 5 weeks 4 days; via spontaneous conception. Both transabdominal and transvaginal ultrasounds were performed in the gynecologist's office with no diagnosis of an intra- or extra-uterine pregnancy. The gynecologist ordered a serum human chorionic gonadotropin (HcG) level, and a level of 13000 IU/L was returned that afternoon. 8 days prior, the level was 1000 IU/. With increasing LLQ pain, the patient presented to the Emergency Department (ED) that night following the appointment with her gynecologist. The ED admissions report outlined the patient's history of LLQ pain that radiated to the left flank/back, minimal vaginal bleeding with clots, and actively trying to conceive. She denied vomiting or dysuria and indicated she was taking folic acid. Reports from the ED physician indicated normal vitals, no palpable mass, and no costovertebral angle tenderness. The ED physician requested abdominal, pelvic, and transvaginal ultrasounds to rule out an ectopic pregnancy and noted that the patient had a vaginal bleed, severe LLQ and back pain for 3 days. Lab data indicated serum HcG levels was 7438 IU/L.

Ultrasound examination of the abdomen and pelvis was conducted by the Sonographer using a Toshiba (now Canon) Aplio XG and utilizing a curvilinear C 1-5 MHz transducer. After identifying the patient, obtaining informed consent, and obtaining a relevant clinical history, the abdomen and pelvic ultrasounds were completed. Documentation of the LNMP indicated a gestational age (GA) of 5 weeks, 5 days. Ultrasound interrogation of the midline pelvis demonstrated a closed cervix with a trace of fluid in the fundal endometrium (Figure 1). Transabdominally, there was no evidence of an intrauterine gestational sac or embryo. The right ovary and adnexa were unremarkable. Upon scanning the patient's area of focal tenderness in the LLQ, a complex, heterogeneous mass with an anechoic center was located lateral to the uterus and left ovary. The left ovary contained a thick-walled ovoid structure (Figure 2). This lesion was seen separate from the left ovary and was surrounded by an elongated, tubular fluid-filled structure measuring 8.8cm (L). Two anechoic ovoid sacs were seen within the heterogeneous mass. Using a higher frequency Curved Linear transducer 10C3 (6MHz), two gestational sacs, each with a yolk sac and live embryo were demonstrated (Figures 3 & 4). A Lambda sign indicated a dichorionic diamniotic twin pregnancies (Figure 5). Twin A was located in the anterior sac, and twin B in the more posterior sac (Figure 5). Fetal crown-rump length measurements indicated

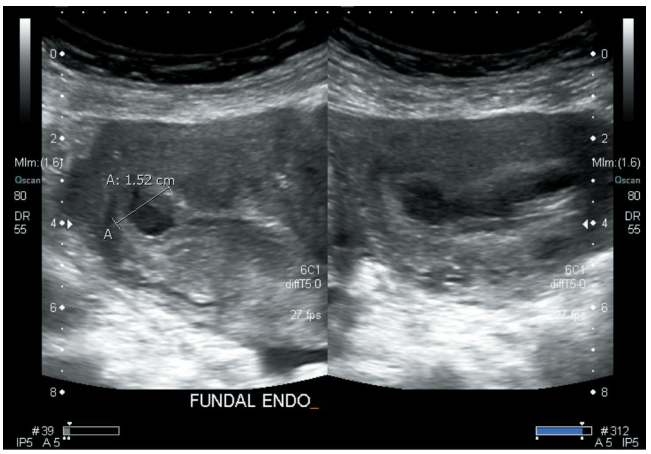

Figure 1. Trace of fluid in the fundal endometrium.

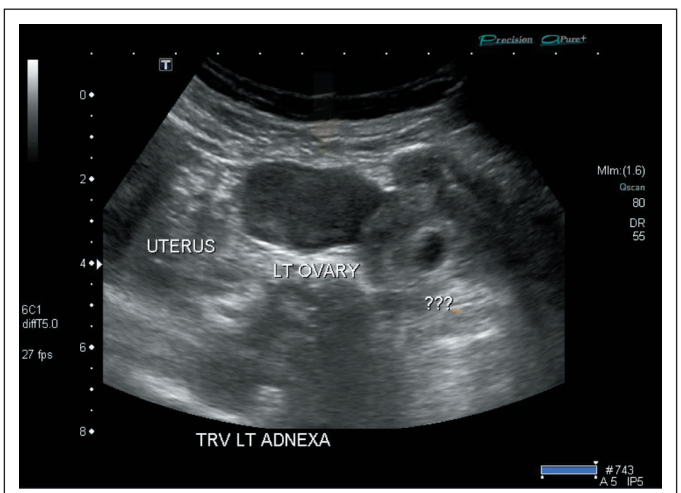

Figure 2. Left ovary containing a thick-walled ovoid structure.

twin A as 5W4D and twin B as 5W5D correlating with the LNMP; cardiac activity was documented on both fetuses with M-mode and cine clips. Free fluid was noted posterior and surrounding the ectopic twin pregnancies in the LLQ (Figure 6).

Sonographic examination of the kidneys, upper quadrants, and remainder of lower quadrants were unremarkable. The staff radiologist was consulted to verify the findings on the transabdominal pelvic scan and requested a transvaginal scan be done. The Sonographer directed the patient to void; upon her return to the ultrasound bay, informed consent was obtained after confirmation that there were no latex allergies or any contraindications to this exam. The patient was draped to maintain patient dignity and privacy. The patient was placed in a Trendelenburg position with an angled sponge under the buttocks, the transvaginal transducer was dressed as per protocol and the transvaginal ultrasound was conducted. Upon sonographic assessment, the fluid demonstrated within the endometrial canal on the transabdominal ultrasound was no longer visualized, and there was no evidence of an intrauterine gestational sac, this further confirmed that there was no intrauterine pregnancy (IUP) (Figure 7). Due to the superior location of the LLQ area of concern (superior to the left iliac crest), the transvaginal exam did not provide any additional information about the LLQ mass. A moderate amount of free fluid with low-level internal echoes was noted in the posterior cul-de-sac

Figure 3. 2 gestational sacs, yolk sac is seen in A PLS.

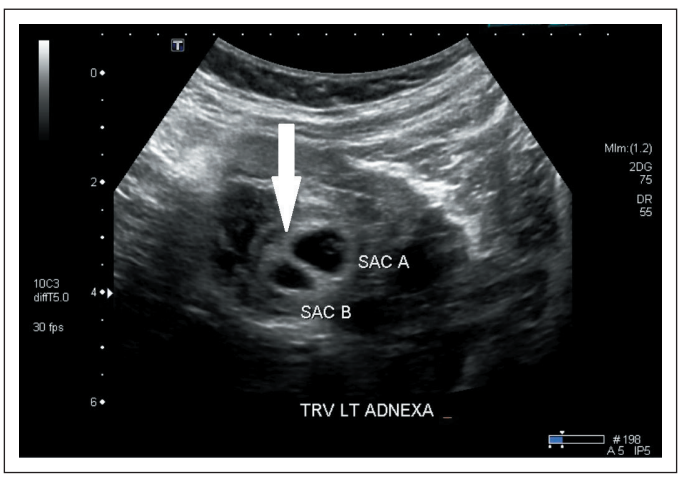

Figure 5. Lambda sign indicating a dichorionic diamniotic twin pregnancies.

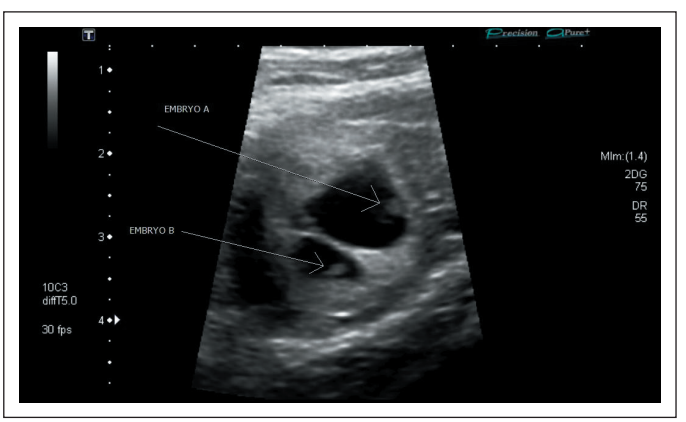

Figure 4. Two gestational sacs with embryos.

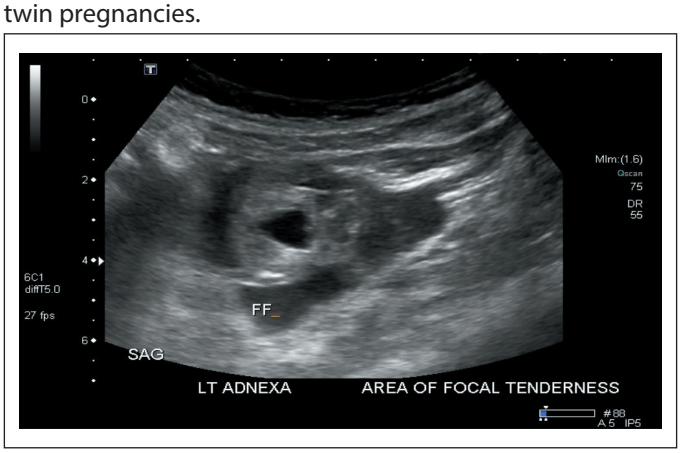

Figure 6. Free fluid surrounding the ectopic twin pregnancies in the LLQ.

(Figure 8). The patient's caesarian scar was well documented in the anterior lower uterus and an anterior subserosal fibroid was demonstrated in the uterus (Figure 8). The radiologist report described a live, LLQ, twin ectopic pregnancy measuring 3.2 × 3.0 × 2.3 cm, showing 2 gestational sacs each with a yolk sac and 2 live embryos. The ectopics were located lateral to the left ovary at the site of the patient's maximal focal tenderness. Twin A was located anteriorly with mean sac diameter (MSD) 1.0 cm, corresponding to 5 weeks, 5 days. The crown-rump length (CRL) was 2 mm, corresponded to 6 weeks, 1 day. Fetal heart rate (FHR) was visually seen but difficult to obtain accurate tracing, approximately 108 beats per minute (bpm). Twin B was located posteriorly with MSD 0.8 cm, estimated GA 5 weeks, 4 days. The CRL was 2 mm, estimated GA 6 weeks, 1 day. FHR was approximately 157 bpm. The 8.8 cm dilated left fallopian tube was suspected to be a blood-filled or thickened fallopian tube, no other obvious abnormality was appreciated in the LLQ. There was a moderate amount of particulate-free fluid in the posterior cul-de-sac. There was a C-section scar in the maternal uterus. An anterior subserosal uterine fibroid was identified. There was fluid noted in the endometrial canal but no IUP was identified. The kidneys were unremarkable with no hydronephrosis or stones.

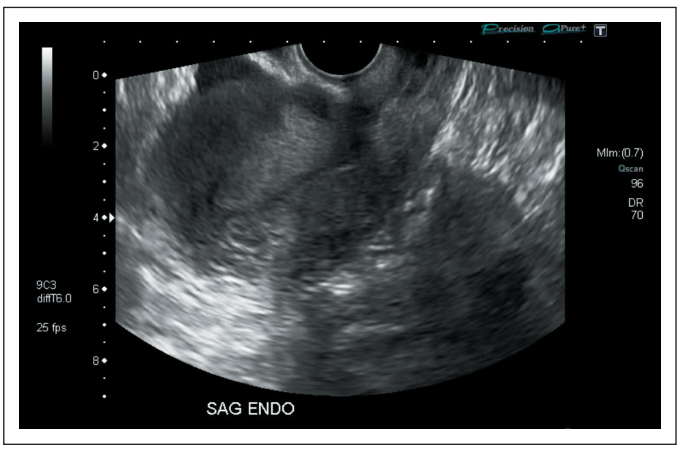

Figure 7. Transvaginal Ultrasound demonstrating thickened endometrium.

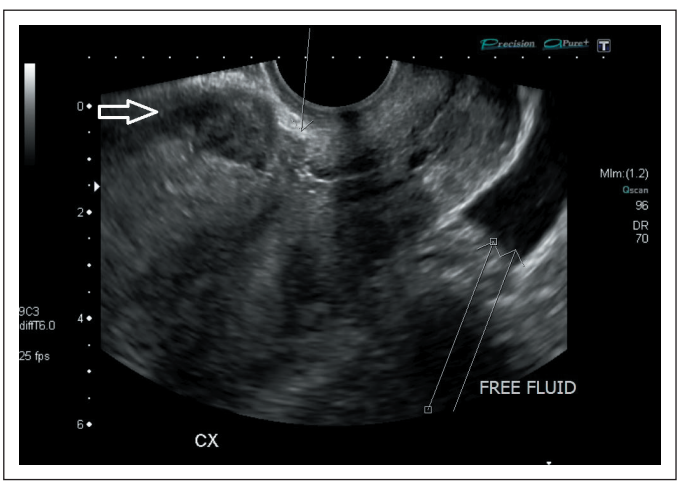

Figure 8. Anterior subserosal uterine fibroid, Caesarian section scar in anterior lower uterine uterus as well as moderate amount of free fluid with low-level internal echoes in the posterior cul-de-sac.

The referring gynecologist reviewed the ultrasound results with the patient and recommended an emergency laparoscopic left salpingectomy, the patient agreed to this procedure and it was carried out the same day. Methotrexate, medical and expectant management were all contraindicated. The operative report described a successful left salpingectomy and suction of the hemoperitoneum, with no adhesions in the pelvis and a normal right ovary and adnexa. The ectopic pregnancy was noted to be in the mid-left fallopian tube with a blood clot stuck at the level of the fimbriae. The report also stated that the left fallopian tube measuring 7.0 cm in length (ultrasound measured 8.8 cm). The external surface of the tube was congested, smooth and full with one ragged, partially torn area measuring up to 3.0 cm. There was approximately 200 mL of blood in the pouch of Douglas. Post-op, HcG was documented at 2500 IU/L, greater than a 50% reduction from pre-surgery levels. The patient was discharged the following day with post-op instructions and prescriptions for pain medication as needed and a follow-up appointment at the gynecology clinic in 6 weeks.

Discussion

This 39-year-old patient was found to have no significant risk factors for ectopic pregnancy. The patient has never had a previous ectopic pregnancy or fallopian tube surgery. Even though the

patient has had C-sections, an appendectomy, and a D&C, the patient was found to have no adhesions identified during the laparoscopic left salpingectomy. Additionally, with no documented or known STI's, PID, endometriosis, and cigarette smoking, the patient had little to no significant risk factors for ectopic pregnancy.

With no documentation of other risk factors for ectopic pregnancy, this case was extremely rare, the frequency of live unilateral twin ectopic is approximately 1 in 200 ectopic gestations.[2] This patient did not have any prior PID documentation. One of the few published cases mentioned a case report of unilateral twin tubal ectopic pregnancy in the context of multiple STIs.[3] A concept commonly seen in reports in the context of positive BHcG was that a large volume of echogenic free fluid strongly suggested or even meant ectopic pregnancy.[4] However, that was not necessarily true, it could just mean blood poured out from the fallopian tube due to the discharge produced from the fimbriae end.[4]

In terms of scanning, a useful tip would be to always go through a rigorous and thorough protocol for both the transabdominal and TV scans, so that nothing is missed, then move on to the area of concern. This approach will expedite scan time and cause the least discomfort possible to the patient. Regarding searching for ectopic pregnancies, keep an open mind to the possibility of multiple ectopics, even though this is a fairly rare finding. In this case report, the sonographic findings of a moderate amount of free fluid posterior to the ectopic pregnancy , a fluid filled left fallopian tube as well as free fluid in the pouch of Douglas were important to note. These findings suggested a ruptured ectopic pregnancy and definitive evidence of a tear in the fallopian tube was confirmed surgically.

The indication of a vaginal bleed is related to ectopic pregnancies but the pain superior to the left iliac crest is in an unusual location for an extra-uterine gestation. This emphasizes the need to listen to the patient and thoroughly examine the area of interest on the transabdominal ultrasound; even changing transducer frequencies to assess the area since transvaginal ultrasound may not be able to visualize pathologies that are more superior to the adnexa.

Conclusion

This case has described a patient with no known risk factors for an ectopic pregnancy presenting with the very rare findings of a live, twin, unilateral tubal ectopic. As a sonographer, it is crucial to correlate the patient's signs, symptoms, and lab data to target the abnormality you are searching for. When ruling out an ectopic, you must thoroughly investigate the transabdominal ultrasound before progressing to a transvaginal exam since the transvaginal examination has a limited field of view, you may not be able to see more superiorly placed ectopics as was shown in this case. Ultrasound is the gold standard for diagnosing ectopic pregnancy, it is accessible, timely, and has no known bioeffects but depends on the sonographer's competency. This case report emphasizes that significant risk factors do not have to be present to have an ectopic pregnancy and that finding one ectopic does not rule out multiple ectopic pregnancies. It is essential to be vigilant when conducting both the transabdominal and transvaginal ultrasound exam since the finding of an ectopic is an emergency finding and can be fatal.

Acknowledgment

Images were used with permission obtained from chief privacy officer and director of medical imaging at Sunnybrook Health Sciences Centre.

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Article Title: A Rare Case of a Live Dichorionic Diamniotic Twin Tubal Ectopic Pregnancy

Author Name: Jia Qian Lu, BMRSc, DMS, CRGS, RDMS

1. Which of the following is a significant risk factors for an ectopic pregnancy may be

1. Endometriosis
2. Pelvic adhesions
3. Cigarette smoking
4. Alcohol consumption
5. Pelvic inflammatory disease
6. Previous ectopic pregnancy
7. Previous fallopian tube surgery
8. Sexually transmitted infections

Choices:
a. 1,2,5,6,7
b. 2,4,5,6,7,8
c. 3,4,5,6,7,8
d. 1,2,3,5,6,7,8
e. 2,3,4,5,6,7,8

2. According to this authors literature review; the frequency of live unilateral twin ectopic

a. 1 in 10 ectopic gestations
b. 1 in 50 ectopic gestations
c. 1 in 100 ectopic gestations
d. 1 in 200 ectopic gestations

3. The best practice for finding an ectopic on ultrasound is conducting

a. A transabdominal ultrasound
b. A transvaginal ultrasound
c. A cursory transabdominal ultrasound followed by a thorough transabdominal ultrasound
d. A thorough transabdominal ultrasound followed by a thorough transvaginal ultrasound as per protocol

4. In this case _____ diagnostic for locating and documenting the live, twin ectopics

a. The transvaginal ultrasound was
b. The transabdominal ultrasound was
c. Both transabdominal ultrasound and transvaginal ultrasound were

5. In this case report the sonographic findings of a _____, _____, _____ suggested a ruptured ectopic pregnancy and definitive evidence of a tear in the fallopian tube was confirmed surgically.

1. Fluid filled left fallopian tube
2. Free fluid in the peritoneum
3. Free fluid in the pouch of Douglas
4. Free fluid posterior to the ectopic pregnancy

Choices:
a. 1.2.3
b. 1,3,4
c. 2,3,4
d. 1,2,4

Megan Britto, BMRSc, DMS, CRGS
Karen Strike, BKin Hons, MScPT
John Donnellan, MB, BCh, BAO, MSc, MMedSci, FFRRCSI
Nina Stein, MD, MSc, FRCPC

MicroPure Imaging Technology to Image the Thyroid in a University Tertiary Referral Centre

About the Authors

Megan Britto is with the Credit Valley Diagnostic Centre in Mississauga Ontario, Canada.

Karen Strike is with the Division of Hematology/Oncology, McMaster Children's Hospital, Hamilton Health Sciences and the School of Rehabilitation Science, Faculty of Health Science, McMaster University, Hamilton, Ontario, Canada.

John Donellan is with the Department of Radiology, McMaster Children's Hospital, Hamilton Health Sciences, Hamilton, Ontario, Canada.

Nina Stein is with the Department of Radiology, McMaster Children's Hospital, Hamilton Health Sciences, Hamilton, Ontario, Canada.

Corresponding author: Megan Britto: meganbritto@gmail.com

ABSTRACT

This retrospective chart review aims to describe the results of using MicroPure in cases of thyroid ultrasound imaging. Ultrasound studies with thyroid nodules that included ultrasound images in 2D B-mode and MicroPure were examined. The results of this review showed contradictory information regarding microcalcifications, colloid deposits, and risk stratification. Further research is required before clinical implementation and incorporation of the technique into protocols and guidelines.

Keywords: Benign thyroid nodules, Thyroid nodules, Ultrasound, Micropure, Thyroid imaging, Microcalcifications, Breast.

Introduction

MicroPure is an ultrasound (US) technique initially developed to assist in the detection of microcalcifications in breast tissue.[1] Limited studies have tested MicroPure in detecting microcalcifications in thyroid nodules.

Thyroid Imaging Reporting and Data Systems (TIRADS) and the American Thyroid Association guidelines stratify the risk for thyroid cancer based on imaging features of thyroid nodules.[2,3] Colloid deposits comprise thyroglobulin, an inactive thyroid hormone storage form.[4] Colloid deposits

are shown as bright foci with comet tail artifact.[5] Microcalcifications are small echogenic foci (=/< 1 mm) and are differentiated from colloid deposits through a comet tail artifact.[5] Microcalcifications elevate the risk for malignancy and indicate the need for fine need aspiration (FNA) biopsy depending on the size of the lesion, whereas colloid deposits do not.[3] The aim of this study is to describe the clinical experience using MicroPure in a retrospective case series of thyroid imaging.

Methodology

This study was approved by the Hamilton Integrated Research Board of Ethics. Studies were identified from thyroid US exams between January 2012 and December 2017 (MicroPure was only available at the site during this time) with no age restrictions and included B-mode and MicroPure. Each exam included age, gender, exam date, the reason for exam, presence of microcalcifications and/or colloid deposits in B-mode, presence of microcalcifications in MicroPure, lesion size, TIRADS classification of the nodule, FNA result, and pathology result of thyroidectomy. MicroPure was applied as per the technologist discretion. Studies were reviewed by an experienced radiologist to determine the presence of microcalcifications, colloid deposits, and TIRADS classification. Statistical analysis included calculating means and standard deviations for normally distributed data and numbers/percentages for categorical data.

Results

Thirteen studies met the inclusion criteria (age range 4-81 years; mean 42 years +/- 26 years; 2 male (15.38%), 11 female (84.61%). Indications for the thyroid scan: 10 patients had known thyroid nodules; one was an incidental finding on another imaging modality; two cases had a palpable mass. One case had the nodule located inferior to the thyroid, and TIRADS was not calculated.

Table 1 demonstrates the results of B-mode and MicroPure. MicroPure was concordant with B-mode in the presence of microcalcifications in five cases (71.43%) and did not detect microcalcifications seen on B-mode in two cases (28.57%). In three patients (23.08%), MicroPure suggested the presence of microcalcifications, which was not seen in B-mode. MicroPure was concordant with B-mode

Table 1. Comparison between B-mode Analysis and MicroPure Results.

Case Number	Age (years)	B-mode Microcalcification (yes/no)	MicroPure calcification (yes/no)	TI-RADS (based on B-mode)	TI-RADS (based on MicroPure)	Lesion size (cm)*	FNA biopsy/surgical results
1	56	N	Y	4	5	0.2	Adenomatous Nodule
2	81	Y	Y	5	5	0.9	N/A
3	39	N	N	4	4	4.6	benign follicular nodule
4	43	N	Y	4	5	2.1	Benign
5	16	Y	Y	5	5	1.7	Papillary Thyroid Carcinoma
6	65	N	Y	3	4	1.5	Benign
7	76	Y	N	5	5	2.1	N/A
8	60	N	N	1	1	0.5	N/A
9	19	N	N	1	1	0.2	N/A
10	12	Y	Y	5	5	0.7	Unsatisfactory
11	17	Y	N	5	4	0.9	Adenomatoid Nodule
12	59	Y	Y	5	5	3.0	Non-Diagnostic
13**	4	Y	Y	N/A	N/A	1.9	Dermoid Cyst

* Largest diameter
N/A – patient did not undergo FNA biopsy
** Lesion outside the thyroid, located inferior and adjacent to it. TI-RADS was not applicable (N/A)

in eight cases (62%) and discordant in five cases (38%). MicroPure increased the TIRADS classification in three cases. B-mode and MicroPure showed microcalcifications in the nodule outside the thyroid which did not help narrow the differential diagnosis. Bright dots suggestive of microcalcifications were noted outside the thyroid gland on MicroPure, in four cases. The change in grey scale gain changed the interpretation of MicroPure in one case and made the echogenic dot disappear from MicroPure.

Discussion

MicroPure uses two image processing's; 'ApliPure' combines spatial and frequency compounding for high-contrast resolution and tissue uniformity; 'Constant False Alarm Rate' filter uses interpolation to extract isolated high-brightness echoes.[6] MicroPure presents high-brightness dots overlapped on B-mode images and a layer of dark blue.[6] This technique was initially developed to assist in microcalcification detection on breast ultrasound.[7]

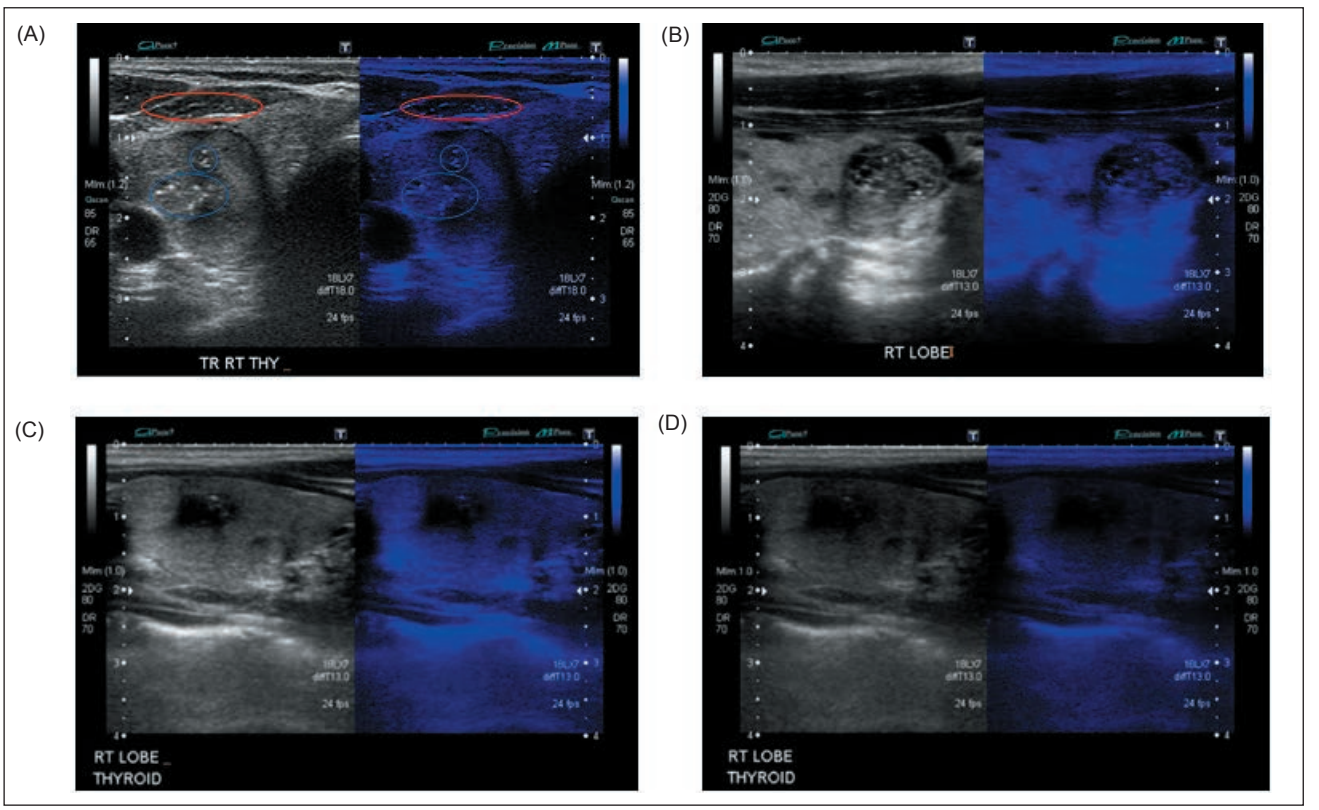

Figure 1. (A) 59-year-old female patient presented with a palpable mass. Microcalcifications were detected on a thyroid nodule in 2D B-mode and MicroPure (blue circles). Note the MicroPure detected bright echogenic interfaces of the neck muscles displaying them as microcalcifications (red circle). A subsequent biopsy of this nodule was non-diagnostic. (B) 65-year-old female demonstrates a nodule has a spongiform appearance with echogenic foci. B-mode displayed echogenic foci surrounded by cystic fluid and small comet tail artifacts. On MicroPure, several of these echogenic foci were detected as microcalcifications and displayed as bright dots. A TIRADS score of 3 was assigned to the lesion with B-mode. Due to the display of microcalcifications on MicroPure, a higher TIRADS score of 4 was assigned. A biopsy determined the nodule to be benign. (C) 17-year-old female with a known thyroid nodule was examined. On B-mode, an echogenic focus suspicious of a microcalcification was seen. On MicroPure, this echogenic focus was detected and displayed as a microcalcification. (D) When the greyscale gains are decreased, MicroPure does not display the echogenic foci. TIRADS classification for this nodule is 5 on B-mode as it presents microcalcifications. However, on MicroPure, the decreased gains removed the visualization of microcalcifications and is classified as TIRADS 4.

Preliminary studies showed that MicroPure can improve the visualization of microcalcifications compared to b-mode ultrasound in breast lesions, although further research is required.[7]

Literature showed MicroPure could assist in the detection of microcalcifications in thyroid nodules[8] and help in determining if nodules are malignant.[9] It suggested that colloid deposits could present as microcalcifications without a comet tail.[10] This study showed that MicroPure highlighted colloid deposits and microcalcifications.

It was found MicroPure was not concordant with B-mode in all nodules. We hypothesized that this may be due to changing the acquisition gain which can alter the interpretation of the MicroPure findings. In addition, MicroPure could also cause false positive detection of microcalcifications as any isolated bright echoes are displayed as microcalcifications.

In this research study, MicroPure altered FNA biopsy indications and follow-up imaging timing. This could have implications for patients and the public health system. Therefore, we have formally requested that Sonographers in our department not use MicroPure for thyroid imaging until further research is done.

Limitations to this study included; the study was retrospective , the sample size was small, and no formal training or standardized guidelines were available to the Sonographers. The recommendation would be that research be done prospectively, with larger sample sizes, and use an experienced Sonographer or two who has been trained with a standardized protocol.

Conclusion

In this retrospective research study MicroPure has shown contradictory information regarding the documentation of microcalcifications, colloid deposits, and risk stratification. Further research with a prospective patient pool, a larger sample size and the training of a select few experienced sonographers trained on a scanning protocol is required before clinical implementation and incorporation of MicroPure into protocols and guidelines for scanning the thyroid gland.

Disclosure

We do not have any conflicts of interest to disclose.

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Article Title: MicroPure Imaging Technology to Image the Thyroid in a University Tertiary Referral Centre

Authors' Name: Megan Britto, BMRSc, DMS, CRGS; Karen Strike, BKin Hons, MScPT; John Donnellan, MB. BCh. BAO. MSc. MMedSci. FFRRCSI; Nina Stein, MD, MSc, FRCPC

MicroPure uses two image processing's; 'ApliPure' combines spatial and frequency compounding for high-contrast resolution and tissue uniformity; 'Constant False Alarm Rate' filter uses interpolation to extract isolated high-brightness echoes

1. **Which of the following techniques is not used in MicroPure technology:**
   a. Spatial Compounding
   b. Harmonic frequencies
   c. Dark blue background
   d. Constant False Alarm Rate

2. **True or false: MicroPure was initially developed to assist in microcalcification detection on thyroid ultrasound.**
   a. True
   b. False

3. **How are microcalcifiations and colloid deposits differentiated?**
   a. Size
   b. Pixel brightness
   c. Comet tail artifact
   d. Posterior shadowing

4. **True or false: Colloid deposits are benign and increase the risk for a fine needle biopsy.**
   a. True
   b. False

5. **Which of following statements is false?**
   a. Microcalcifications elevate the risk for malignancy
   b. MicroPure extracts isolated high-brightness echoes
   c. Colloid deposits comprise thyroglobulin, an inactive thyroid hormone storage form
   d. MicroPure has been thoroughly researched about detecting microcalcifications in thyroid nodules

Nina Romanova. CRGS, RDMS

Assessment Challenges of Echogenic Breast Lesions

About the Author

Nina Romanova is a Sonographer at Canada Diagnostic Centres based in Calgary, Alberta, Canada

Corresponding author: Nina Romanova: nina67roma@gmail.com

ABSTRACT

An echogenic breast mass is defined as a hyperechoic lesion compared with subcutaneous adipose tissue at ultrasonography (US). This is in accordance with the US lexicon of the Breast Imaging Reporting and Data System (BI-RADS) of the American College of Radiology. Although most echogenic solid breast masses identified on ultrasound imaging are benign, hyper-echogenicity alone does not exclude malignancy. Approximately 0.5% of malignant breast lesions appear echogenic. Therefore, upon finding a solid, echogenic mass on ultrasound, it is important to correlate with the mammographic findings to decide on the necessity of a biopsy. The case reports in this paper confirm that similar-looking masses on ultrasound imaging can have a different diagnosis.

Keywords: Ultrasound, Mammogram, Ultrasound-mammographic correlation, Breast imaging, Echogenic lesion, Breast carcinoma

Introduction

The following case reports demonstrate how similar solid echogenic lesions visualized on ultrasound can present with histologically different processes. Therefore, the importance of mammographic-sonographic correlation in assessing echogenic breast masses is important to decide on the need for a biopsy.

Case Descriptions

Clinical Case #1

A 58-year-old female presents for a screening mammogram with no clinical concerns. She reported that there is no family history of breast carcinoma. The mammogram demonstrated multiple areas of fibro glandular density and a spiculated, irregular mass in the lateral aspect on Cranio-Coudal (CC) view, close to the nipple line on the mediolateral oblique view (MLO). The patient has had prior mammograms (Figures 1A–D) with no evidence of this mass.

An ultrasound examination of the breast was requested and conducted by the Sonographer to evaluate the abnormal mammographic findings The ultrasound was performed on a GE Logiq 9 ultrasound machine utilizing a linear 10 MHz transducer, breast preset and optimized gain settings

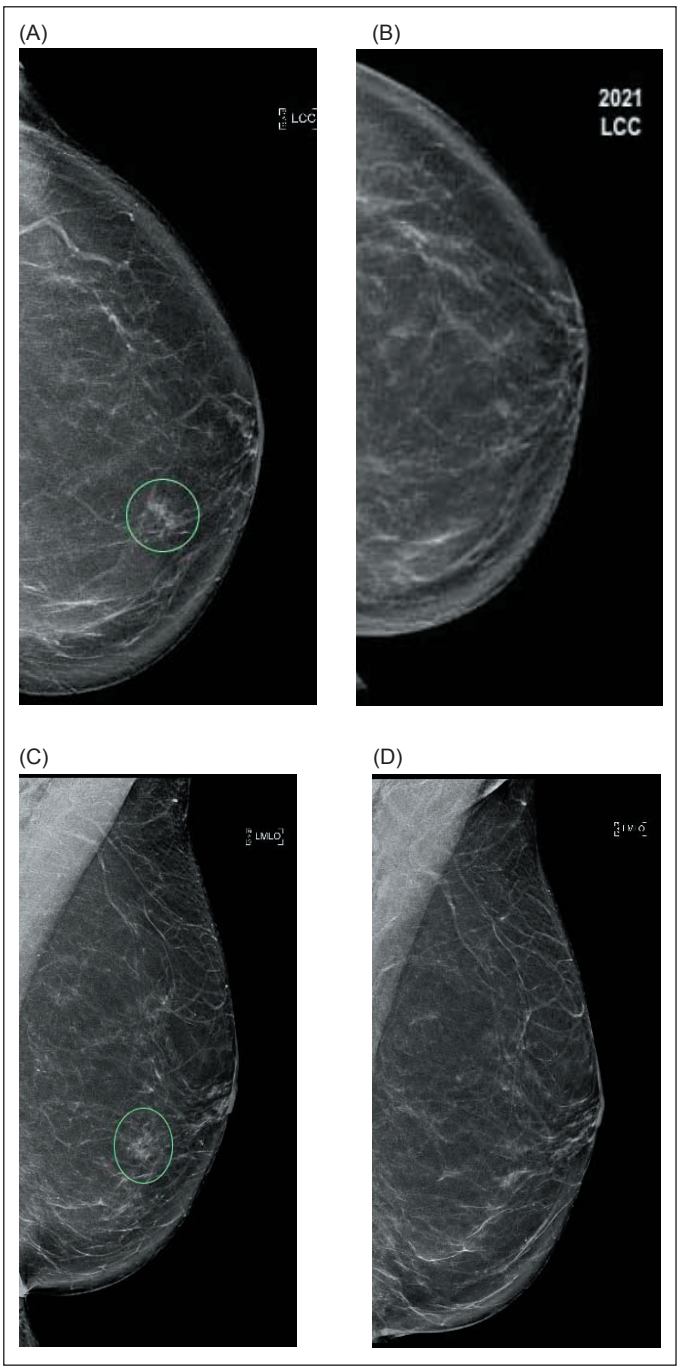

Figure 1. (A) Lt CC - mammographic image of 2022 demonstrates the area of a new asymmetry in medial aspect (circled); (B) Lt CC mammographic image demonstrates the absence of the asymmetry in the medial aspect of Lt breast in 2021; (C) Lt MLO mammographic image 2022 demonstrates a new area of asymmetry slightly lower than the nipple line (circled); (D) Lt MLO mammographic image 2021 demonstrates the absence of the area of asymmetry in 2021.

and focal zone selection. After obtaining informed consent, the patient was asked to lie supine, and expose the left breast and the patient was draped ensuring maximum privacy. The patient's left arm was above the head and bent to optimize the scanning of the axilla. A 45-degree spinal body positioning wedge was placed under the back and left shoulder to allow access to the lateral aspect of the breast. The medial aspect of the breast was scanned in the supine position. The sonographer detected a 1.4 cm, solid, echogenic, spiculated mass with ill-defined borders at 9 O'C and 2 cm from the nipple (CFN) (Figure 2). This mass correlated with the mammographic findings.

The radiologist correlated the findings on the mammogram and the ultrasound and decided to do a biopsy on this mass. The sonographer set up a sterile biopsy tray and disinfected the ultrasound probe. After explaining the procedure to the patient, consent was obtained. The patient was positioned and draped as per protocol and the radiologist conducted a core biopsy of the mass in the left breast under ultrasound guidance. The sonographer assisted the radiologist during the procedure and provided care for the patient. The tissue samples from the biopsy were sent to the pathology department. The pathology report of this mass indicated that this solid echogenic mass was invasive ductal carcinoma.

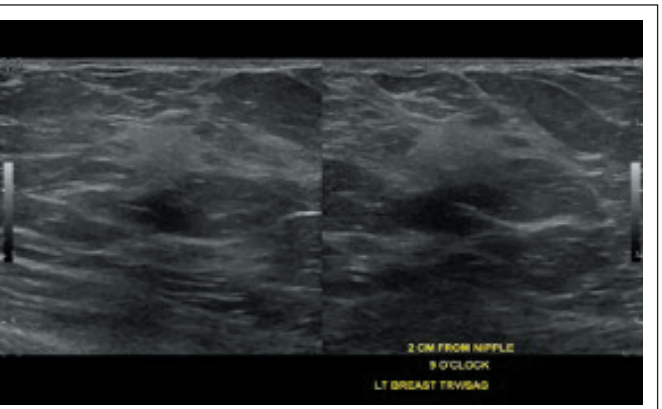

Figure 2. Left breast; 1.4 cm, solid, echogenic mass at 9 O'C 2 CFN.

Clinical Case #2

A screening mammogram was requested by a family physician. The patient, a 53-year-old woman, had no clinical concerns. However, the patient had a history of left breast fibroadenoma diagnosed in 2008 which was confirmed by histological verification. The mammogram revealed an almost entirely fatty breast. A solid nodule was seen in the left breast upper outer quadrant (UOQ), which was unchanged from multiple previous mammograms (Figure 3).

An ultrasound of the left breast was requested by the radiologist to confirm the stability of the lesion. The breast ultrasound exam was performed by the Sonographer on a GE Logiq 9 ultrasound machine with a linear probe set at 12 MHz, gain settings and focal zone selections were optimized throughout the exam.

After obtaining informed consent, the patient was asked to lie supine, and expose the left breast and the patient was draped ensuring maximum privacy. The patient's left arm was above the head and bent to optimize the scanning of the axilla. A positioning 45-degree spinal body positioning wedge was placed under the back and left shoulder to allow access to the lateral aspect of the breast. The lateral aspect of the left breast was scanned in the right posterior oblique position, with the left arm lifted over the head to minimize the thickness of the evaluated breast portion. A 1.8x 1.0 x1.6 cm, solid, echogenic mass parallel to the skin surface was detected at 2 O'C, 3 CFN (Figure 4). This avascular, solid, echogenic mass demonstrated an oval shape, smooth borders and subtle posterior acoustic attenuation.. Since this lesion had not changed from the previous imaging a biopsy was not requested.

Discussion

Echogenic or predominantly solid, echogenic lesions are usually assumed to be benign. However, literature now reports that approximately 0.5%

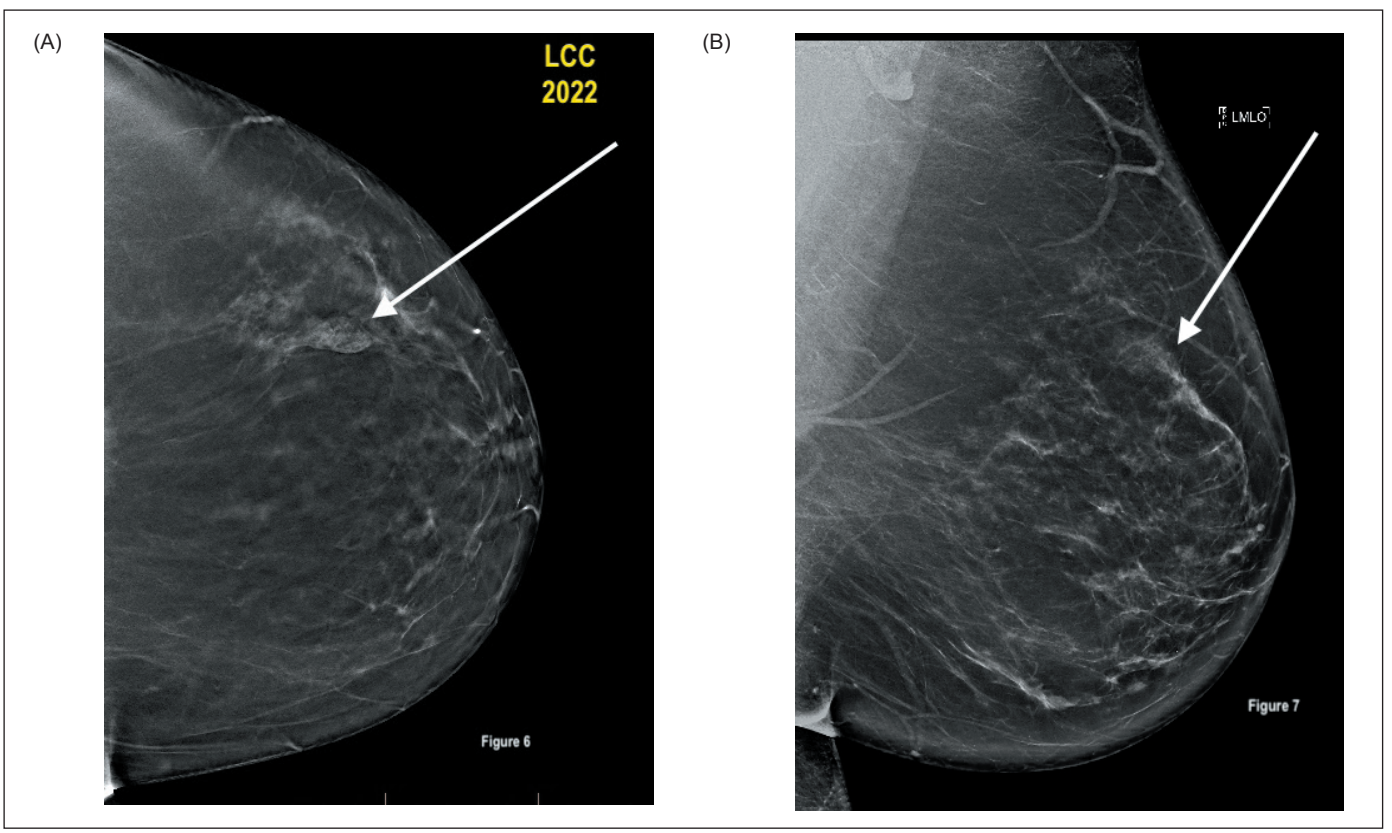

Figure 3. (A) Lt CC mammographic image demonstrates a lower density mass lateral to the nipple line in Left breast in 2022 and (B) Lt MLO mammographic image demonstrates a lower density mass in the upper aspect of the Left breast in 2022.

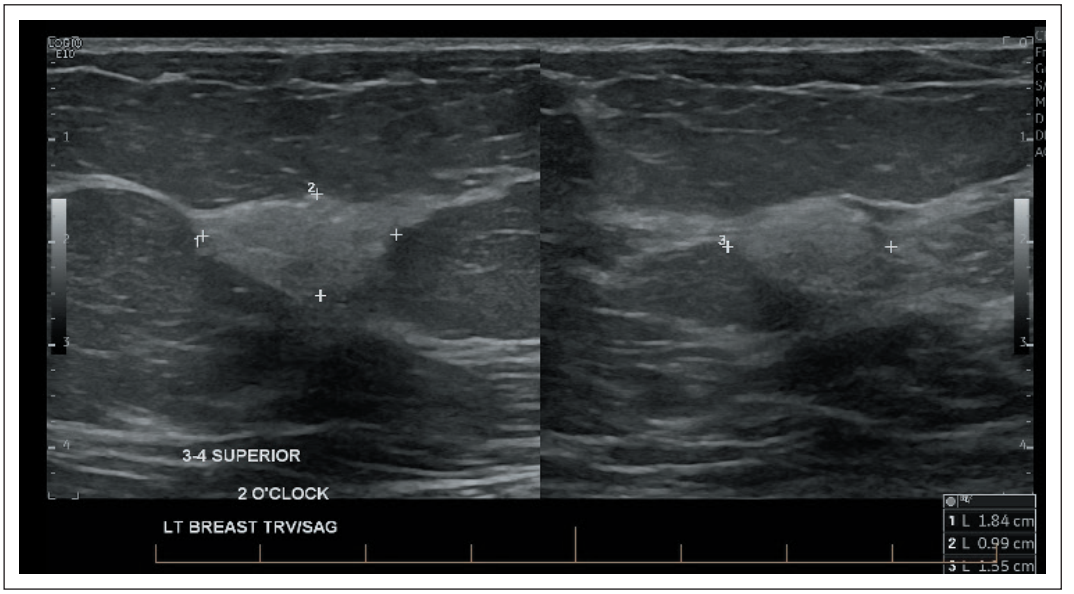

Figure 4. Left breast ultrasound. 1.8×1×1.6cm solid, echogenic mass at 2 O'C- 3 CFN.

of malignant breast lesions appear as solid, echogenic masses.[1–3]

The correlation between the appearance of the ultrasound and mammographic images and clinical history helps the radiologist decide on the need for a biopsy. For example, an echogenic mass that is not radiolucent at mammography may represent various benign changes or a malignant process. If there is pertinent clinical history, suspicious sonographic features such as mass angulations and/or spiculation, nonparallel orientation, posterior features (more often acoustic shadowing) or suspicious mammographic findings such as a spiculated margin, interval enlargement, or association with suspicious microcalcifications or lymphadenopathy. Lesions with nonspecific imaging or clinical features may also require a biopsy to exclude malignancy.[3]

Conclusion

As a sonographer it is important to keep an open mind and not to assume that all solid echogenic breast masses are benign. The sonographer that has the knowledge and skill to review a mammogram can apply this information to the ultrasound exam. Taking a detailed and relevant clinical history is important since the radiologist will require the ultrasound, mammogram as well as the clinical history to make a decision on whether a biopsy is necessary or not in order to get an accurate diagnosis.

Acknowledgements

The author conveys her deepest thanks to Canada Diagnostic Centres (CDC) for giving the opportunity of constant professional advancement as well as for being a part of a team of medical professionals dedicated to breast imaging. Special thanks to CDC Calgary (CWIC) for allowing the use of the images for my publications.

To Roksolana Shadij MD, "School of Medical Sonography" Lviv, Ukraine for inspiring the author to accomplish her professional goals

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Article Title: Assessment Challenges of Echogenic Breast Lesions

Author Name: Nina Romanova. ARDMS, CSDMS/CARDUP

1. Most solid, echogenic breast masses are benign

a. True
b. False

2. According to this author's literature review _____% of solid echogenic breast masses are malignant

a. 2%
b. 5%
c. 50%
d. 0.5%

3. The best correlation of imaging in the case of a breast mass to determine if a biopsy is necessary is

a. CT & MRI
b. Ultrasound & CT
c. Ultrasound & MRI
d. Ultrasound & Mammogram

4. This author indicates that sonographers should _____ for better professional practice

a. Conduct biopsies
b. Conduct mammograms
c. Review a mammogram
d. None of the above

5. Echogenicity of a breast mass alone excludes malignancy

a. True
b. False

Recognizing Excellence

By Susan Clarke, Executive Director, Sonography Canada

Diagnostic medical sonography is a relatively new profession that has only been around since 1942, when Austrian physician Karl Dussik used what he called 'hyperphonography' to capture images of the ventricles of the brain. By 1947, Dr. Dussik produced images that were good enough to diagnose brain tumours. Today, sonography is used throughout the healthcare system to provide key diagnostic information to doctors about a patient's medical condition and to assist in their treatment and care. Sonographers truly help physicians in various disciplines make 'sound decisions'!

There is no doubt that the role of a sonographer has significantly evolved since 1942 and continues to do so to keep up with developments in technology and advancements in clinical research and practice. This evolution is achieved thanks to the curiosity, creativity, and efforts of individuals with a passion for their profession. It is these individuals who truly look to foster best practices and pursue excellence. And without them, progress could not be achieved. They are the trailblazers and champions of our profession and must be acknowledged for their accomplishments.

Sonography Canada believes that recognizing and rewarding members who demonstrate these characteristics leads to improved workplaces and increased pride and recognition for sonographers as essential members of the Canada's healthcare service. It also creates a stronger, engaged group of members.

Ms. Catherine Lo, CRGS, past Chair of Sonography Canada's Awards Committee

"So much time, effort, and resources go into ensuring that individuals have the training, tools, and support they need to get the job done right. And when they do get it right … and the job is done exceptionally well … Sonography Canada believes time and effort should be taken to acknowledge it."

Achieving excellence involves taking deliberate action. It's about having a plan that challenges the status quo and not shying away from obstacles. It's about working hard to achieve that plan while drawing on your own experience, skills, and effort and, most importantly, motivating others around you to contribute in the same way.

Usually, when people think about awards, they think about the actual memento (e.g., trophy, plaque, certificate, gift, etc.) or public recognition that's often associated with them. Rarely do people think about the conscious and deliberate process of nomination, application and selection that takes place to determine a winner.

Recognition comes in many forms and the nomination itself is one of the many ways an individual can be acknowledged for their work, research, and achievements. The fact that someone is taking the time to put someone forward as a deserving candidate implies their desire to see you recognized and confirms that you are already appreciated by someone in your community.

Sonography Canada awards recognize the various roles and accomplishments sonographers can have in their careers starting as students, then as practitioners, mentors, educators, or colleagues:

List of Awards

- Fellowship Award
- Lifetime Achievement Award
- Student Achievement Award
- Outstanding Mentorship Award
- Early Professional Achievement Award
- Outstanding Journal Submission Award
- Outstanding Article or Case Study Award
- Peter McLardie Memorial Education Bursaries

Timelines

- **December/January:** Call for nominations open
- **April 15:** Deadline for nominations
- **May:** Assessment of submissions by the Awards Committee and selection of winners
- **June:** Winners are notified
- **September/October:** Awards are presented

To learn more, to submit a nomination, and to get to know our award recipients, visit: https://sonographycanada.ca/about-us/awards.

Completing a nomination application is time well spent. Not only does it bring happiness and motivation to those whose names are put forward, but it also creates time for reflection and focus for the individual completing the nomination form. We encourage you to head over to the Sonography Canada website to review the award categories and criteria available. As nominations will open in the next couple of months, now is the time to reflect on who has made a direct impact in your profession and consider nominating them.

Carolyn Trottier, Chair of Sonography Canada's Board of Directors,

"As 2022 draws to an end, sonographers are invited to think about the people who stand out among their peers for their innovative spirit, determined curiosity, willingness to champion positive change, and commitment to improve policies, techniques, and work-places. This is the opportunity to celebrate the people who see the 'possible' in the impossible."

Sonography Canada / Échographie® Canada

Sonography Canada 2022 Award Winners

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Sheena Bhimji-Hewitt, DMS, CRGS, CRVS, RVT, RDMS

Outstanding Mentorship Award
Christina Shahipour, CRGS, CRCS, CRVS

Outstanding Article or Case Study Award
Shane Balthazaar, CRCS

Early Professional Achievement Award
Eleze Munro

Student Achievement Award
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Peter McLardie Memorial Education Bursaries
Mohamed Nashnoush, Student
Emily Slack, CRCS, RDCS - Sonographer

Each year, Sonography Canada recognizes and celebrates individuals who have made significant contributions to the profession of sonography or to the association. Our awards acknowledge the various roles and accomplishments sonographers can have in their careers starting as students, then as mentors, educators or colleagues.

Congratulations to this year's laureates!