

Assessment of the Adherence of Radiologists in Reporting the Ovarian Cysts to the 2010 Society of Radiologists in Ultrasound Guidelines

Fariba Zarei^{1,2}, Nargessadat Khatamizadeh², Banafsheh Zeinali-Rafsanjani^{1,3*}

¹Medical Imaging Research Center, Shiraz University of Medical Sciences, Shiraz, Iran, ²Department of Radiology, Shiraz University of Medical Sciences, Shiraz, Iran, ³Nuclear Medicine and Molecular Imaging Research Center, Namazi Teaching Hospital, Shiraz University of Medical Sciences, Shiraz, Iran

Abstract

Background: The objective of this study was to determine the adherence of radiologists to the guideline of the Society of Radiologists in Ultrasound (SRU)-2010 for the follow-up of ovarian cysts in patients during 2015–2016. **Methods:** The patients' data, referring for transvaginal and pelvic ultrasonography, suffering from ovarian cyst were assessed in terms of menopause status, cyst size, and type, as well as follow-ups recommended by radiologist to assess the adherence of reports to SRU-2010. **Results:** Three hundred and sixty-four sonography reports were investigated. Seventy-seven percent of the reports had adhered to SRU-2010, 9.9% and 9.1% had under/overmanagement, and 4.1% was incomplete. 94.2% and 5.8% of cases were in pre/postmenopause status, respectively. The highest adherence belonged to cysts in size <1 cm, 1–3 cm, 5–7 cm. The highest adherence, over/undermanagement, and incomplete reports belonged to corpus luteum, hemorrhagic, dermoid cysts, and nodules without flow. The adherence of sonography reports to SRU-2010 for accidental ovarian cysts was 76.9%. **Conclusion:** The tendency for overmanagement of simple cysts in premenopausal women and the tendency for undermanagement in simple cysts and in postmenopausal women were higher, respectively. It is expected that more training of the guideline to radiologists will lead to the reduction of unnecessary follow-up, which in turn leads to reduced patient's anxiety and cost of treatment.

Keywords: Follow-up, ovarian cyst, ultrasonography

INTRODUCTION

Ovarian cysts are among the most common cases requiring ultrasound follow-up,^[1] causing concern among women. In most cases where the cyst's size is large, surgery might be recommended, which increases the patient's concern, while despite the large size, many cysts require short-term follow-up or drug treatment.^[2] Hence, the lack of radiologists' familiarity with the ovarian cysts follow-up methods can lead to unnecessary sonographies, magnetic resonance imaging (MRI), and surgeries, which only adds concern to the patient, while a short-term follow-up can help eliminate the cyst.^[3]

Considering the sonographic characteristics of a cyst, it is possible to differentiate benign from malignant cysts that their follow-up method is different.^[4,5] To make a consensus between

radiologists, the Society of Radiologists in Ultrasound (SRU) in 2010 proposed a guideline for managing the asymptomatic ovarian cysts.^[6,7] In this guideline, the type of cysts is determined based on their appearance in ultrasound. The detailed classification of ovarian cysts and their suggested follow-up techniques can be seen in the study by Levine *et al.*^[6]

The objective of this study was to determine the adherence of radiologists to the SRU-2010 guidelines for ovarian cysts follow-up in patients referring to university hospitals during 2015–2016.

Address for correspondence: Dr. Banafsheh Zeinali-Rafsanjani, Medical Imaging Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. Nuclear Medicine and Molecular Imaging Research Center, Namazi Teaching Hospital, Shiraz University of Medical Sciences, Shiraz, Iran. E-mail: b.zeinali.r@gmail.com

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MATERIALS AND METHODS

This study was a cross-sectional retrospective study. The data of patients referred for transvaginal and pelvic ultrasonography during 2015–2016 to three of our university-affiliated hospitals and who suffered from ovarian cysts were assessed. This research was approved by the Faculty Research Ethics Committee of Shiraz University of Medical Sciences with the Ethical Approval code of IR.sums.med.rec. 1396.s109. All patient informed consent was obtained.

The patients must have a transvaginal and pelvic ultrasonography report with a confirmed ovarian cyst according to the inclusion criteria. If the patient had multiple ovarian cysts, the follow-up was done based on the more malignant or larger cyst. The patient's suffering from polycystic ovary (PCO), dominant follicle, ectopic pregnancy, hydrosalpinx, peritoneal inclusion cysts, pregnant women, and women with unknown menopause conditions were excluded from the study. It should also be mentioned that only the reports created by expert radiologists were included in the study.

The sonography reports were collected from the picture archiving and communication system. Each of the collected sonography reports was assessed by a single expert radiologist. The menopause status, cyst size, and type of cyst were assessed in all reports. Two menopause statuses were considered premenopause and postmenopause. The cyst sizes were divided into five categories, <1 cm, 1–3 cm, 3–5 cm, 5–7, and more than 7 cm. The cyst type was classified into 12 categories: corpus luteum, simple cyst, hemorrhagic cyst, paraovarian cyst, endometrioma cyst, dermoid cyst, the cysts suspicious to endometrioma, dermoid or hemorrhagic, the cysts with individual delicate septa or with local micro-calcification, the cysts with multiple septa, the cysts containing nodules without vascularity, the cysts with thick and irregular septa, and the cysts containing nodules with vascularity.

The adherence of sonography reports to SRU-2010 guideline was also categorized as adherent, undermanagement, overmanagement, and incomplete. In Table 1, each category is explained according to the guideline and radiologist

suggestions. For instance, in the cases that follow up was not necessary and the radiologist did not suggest any follow up, or in the cases that regular sonography, MRI, or surgery was necessary considering the guideline and radiologist suggested the time specified sonography, MRI or surgery follow up were reported as adherent.

The data were gathered and coded. In order to assess the relationship between the radiologist's suggestions and cyst size, cyst type, and menopause status Chi-square test was used. A $P = 0.05$ is considered as the significant level.

RESULTS

In total, 476 transvaginal and pelvic sonography reports were assessed. According to the exclusion criteria, 36 patients who were pregnant, six who had hydrosalpinx and peritoneal inclusion cysts were excluded from the study. For 20 cases, sonography for non-adnexal reasons was performed. In 14 cases, the follow-up ultrasonography was performed, which was not their primary ultrasonography. In 36 cases, the patient's age was not specified, so their menopause status could not be determined. Therefore, 364 sonography reports were included in the study.

In general, 76.9% of the sonography reports were adherent to SRU-2010, 9.9% and 9.1% had under- and overmanagement, and 4.1% was incomplete. Menopause status, cyst size, and type of cyst were assessed. The adherence of sonography reports was evaluated in each case.

Three hundred and forty-three (94.2%) and 21 (5.8%) out of the 364 cases were in pre- and postmenopause status, respectively. The adherence of sonography reports to SRU-2010 in terms of menopause status is shown in Table 2.

The cyst size was assessed according to the classification mentioned in the method section. The adherence of sonography reports to SRU-2010 was also evaluated based on cyst size. The results are shown in Table 3.

As shown in Table 3, the highest adherence belonged to cysts with the size 1–3 cm (86.4%), 3–5 cm (78.4%), <1 cm (50%),

Table 1: Categorization on adherence of sonography reports with Society of Radiologists in Ultrasound 2010 considering the guideline and radiologist's report

Category	Guidelines suggestion	Radiologist suggestions
Adherent	Follow-up is not necessary	No follow-up has been suggested
	Time specified sonography is required	Time specified sonography has been suggested
	MRI or surgery is required	MRI or surgery has been suggested
Undermanagement	Follow-up is necessary	No follow-up has been suggested
	Time specified sonography is required	Late sonography has been suggested
	MRI or surgery follow-up is required	Sonography follow-up has been suggested
Overmanagement	Follow-up is not necessary	Sonography follow-up has been suggested
	Time specified sonography is required	Early sonography has been suggested
	Sonography follow-up is required	MRI or surgery follow-up has been suggested
Incomplete	Time specified sonography is required	Sonography follow-up has been suggested but with no specific time

MRI: Magnetic resonance imaging

respectively. Based on the guideline, no follow-up was required, and radiologists did not suggest any follow-up.

The cyst type was assessed according to the classification mentioned in the method section. The adherence of sonography reports to SRU-2010 was also evaluated in terms of cyst type. The results are shown in Table 4.

As shown in Table 4, most adherence, over- and undermanagement, and incomplete reports belonged to corpus luteum, hemorrhagic, dermoid cysts, and nodules without flow.

DISCUSSION

Ovarian cysts are one of the most common causes for women referring for sonography.^[1] These cysts usually create concern in women. In most cases, the cyst size is large; hence, physicians suggest surgery, increasing the patient's anxiety. Most of these cysts can be eradicated using the medical treatment and short follow-up. Radiologists' unfamiliarity with tracking the ovarian cysts can lead to unnecessarily repeated sonography, MRI, and surgeries, increasing patients' anxiety

and anxiousness; however, there is no need to be concerned since most of them require a short-term follow-up.

Differentiating malignant from benign cysts is possible based on the size and sonographic characteristics of cysts. This is important because the follow-up methods of cysts vary, depending on their type. The existing guidelines, such as SRU-2010, avoid the personal approach by physicians in managing these cysts. Therefore, given the critical role of this guideline, it is imperative to evaluate and increase the adherence to sonography reports. In this study, the radiologist's approach to ovarian cysts, which were randomly seen in transvaginal and pelvic ultrasonography of patients referring to the University hospitals, was assessed, and the compliance of the reports to SRU-2010 guideline was evaluated.

According to the results, the overall adherence of sonography reports to SRU-2010 in this study was 76.9%. A study by Rosenkrantz and Kierans, in 2014, evaluated the adherence of radiologists to SRU-2010,^[1] and the overall adherence was 59%, which was almost 18% less than the results of our study.

Table 2: The frequency of menopause status and the adherence of sonography reports to Society of Radiologists in Ultrasound 2010 regarding menopause status

Menopause status (n)	n (%)	Adherent, n (%)	Overmanagement, n (%)	Undermanagement, n (%)	Incomplete, n (%)
Premenopause	343 (94.2)	271 (79)	33 (9.6)	29 (8.5)	10 (2.9)
Postmenopause	21 (5.8)	9 (42.9)	0	7 (33.3)	5 (23.8)

Table 3: The frequency of cyst size in each category, according to the classification and the adherence of sonography reports to the Society of Radiologists in Ultrasound 2010 in terms of cyst size

Cyst size categorization	n (%)	Adherent, n (%)	Overmanagement, n (%)	Undermanagement, n (%)	Incomplete, n (%)
Size <1 cm	8 (2.2)	4 (50)	0	4 (50)	0
1 cm < size <3 cm	184 (50.5)	159 (86.4)	10 (5.4)	12 (6.5)	3 (1.6)
3 cm < size <5 cm	139 (38.2)	109 (78.4)	20 (14.4)	3 (2.2)	7 (5)
5 cm < size <7 cm	20 (5.5)	4 (20)	3 (15)	9 (45)	4 (20)
Size >7 cm	13 (3.6)	4 (30.8)	0	8 (61.5)	1 (7.7)

Table 4: The frequency of cyst type in each category, according to the classification and the adherence of sonography reports to the Society of Radiologists in Ultrasound 2010 in terms of cyst type

Cyst type categorization	n (%)	Adherent, n (%)	Overmanagement, n (%)	Undermanagement, n (%)	Incomplete, n (%)
Corpus luteum	79 (21.7)	79 (100)	0	0	0
Simple cyst	146 (40.1)	103 (70.5)	22 (15.1)	14 (9.6)	7 (4.8)
Hemorrhagic cyst	39 (10.7)	28 (71.8)	8 (20.5)	2 (5.1)	1 (2.6)
Paraovarian cyst	5 (1.4)	4 (80)	1 (20)	0	0
Endometrioma	9 (2.5)	2 (22.2)	1 (11.1)	5 (55.6)	1 (11.1)
Dermoid cyst	8 (2.2)	1 (12.5)	1 (12.5)	6 (75)	0
Suggestive of hemorrhagic, endometrial, or dermoid cyst	64 (17.6)	55 (85.9)	0	5 (7.8)	4 (6.3)
Thin simple septa	3 (0.8)	2 (66.7)	0	0	1 (33.3)
Multiple septa	7 (1.9)	5 (71.4)	0	2 (28.6)	0
Nodule without vascularity	2 (0.5)	0	0	1 (50)	1 (50)
Thick irregular septations	0	0	0	0	0
Nodule with vascularity	2 (0.5)	1 (50)	0	1 (50)	0

As shown in Tables 2-4, the most overmanagement reports belonged to premenopause status simple, hemorrhagic, paraovarian cysts with the size of 3–5 cm. Since during premenopausal age, the cysts are mostly physiologic; hence, they can be ignored. According to the guidelines, to reduce the patient's anxiety and cost of treatment, these cysts do not require any follow-up, but in some sonography reports, a short-term follow-up to reassure that they were gone was suggested.^[8,9] Some overmanagement was seen for other cases, for instance, in simple cysts with the size of 5–7 cm in premenopausal women; the guideline suggests annual follow-up; however, the radiologists recommended immediate follow-up, which revealed that the radiologists should be trained and introduced to the guideline for these cases.^[3,10]

The most undermanagement reports belonged to postmenopausal women and complex sonography characteristics, such as endometrioma, dermoid, cysts with multiple septa, cysts with nodule with or without vascularity the cyst size of <3 and more than 5 cm. According to the guideline, some follow-up is required for these cysts, but the radiologists did not suggest any follow-up.

For instance, conventionally, a postmenopausal woman with a simple cyst size 1–7 cm, surgery follow-up was recommended by physicians since it was believed that there is no physiologic cyst in postmenopausal status in these ages should be removed by surgery. Therefore, considering the previous approaches, overmanagement was expected. However, today's studies revealed that most postmenopausal simple cysts are benign, and fortunately, no overmanagement was seen for postmenopausal women, which shows the increased knowledge about the benign nature of the cysts during the postmenopause phase.

It should be noted that there are different guidelines for clinical follow-up for different domains, such as pulmonary nodule by Fleischner 2017 guideline for pulmonary nodules and breast mass (BIRADS). There are some guidelines for reporting different research studies in the radiology domain, such as diagnostic accuracy reporting guidelines (STARD) and standard for reporting clinical trials (CONSORT). The radiologist's adherence to these guidelines are the subject of several studies.^[11-14]

There is no doubt that training and introducing the guidelines to radiologists will reduce the follow-up of benign cases. Therefore, we suggest introducing this guideline and/or any other guidelines to reduce patient anxiety by avoiding unnecessary procedures.

CONCLUSION

In the university hospitals, the adherence of sonography reports to SRU-2010 for accidental ovarian cysts was 76.9%. According to this guideline, the tendency to overmanage simple cysts in premenopausal women and the tendency to

undermanage simple cysts in postmenopausal women were higher, respectively. This inconsistency in overmanagement and undermanagement in pre–post-menopausal patients might be seen in this study's small number of postmenopausal groups. The radiologist did not suggest any follow-up for these patients, even though annual sonography was recommended by SRU-2010. Hence, the physician should decide on the follow-up method, which might lead to undermanagement since they can suggest no follow-up or overmanagement since they probably recommend MRI or surgery, which their cost and induced anxiety in patients are more than annual sonography.

Considering that the adherence in this study was higher than in previous studies, it can be concluded that with more training of the radiologists, guidelines will be better implemented, leading to a reduction in unnecessary follow-up, which in turn reduces patient's anxiety and cost treatment.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Rosenkrantz AB, Kierans AS. US of incidental adnexal cysts: Adherence of radiologists to the 2010 Society of Radiologists in Ultrasound guidelines. *Radiology* 2014;271:262-71.
- Modesitt SC, Pavlik EJ, Ueland FR, DePriest PD, Kryscio RJ, van Nagell JR Jr. Risk of malignancy in unilocular ovarian cystic tumors less than 10 centimeters in diameter. *Obstet Gynecol* 2003;102:594-9.
- Gransj oen AM, Wiig S, Lysdahl KB, Hofmann BM. Barriers and facilitators for guideline adherence in diagnostic imaging: An explorative study of GPs' and radiologists' perspectives. *BMC Health Serv Res* 2018;18:556.
- Kim DC, Bennett GL, Somberg M, Campbell N, Gaing B, Recht MP, *et al.* A multidisciplinary approach to improving appropriate follow-up imaging of ovarian cysts: A quality improvement initiative. *J Am Coll Radiol* 2016;13:535-41.
- Maturen KE, Blaty AD, Wasnik AP, Patel-Lippmann K, Robbins JB, Barroilhet L, *et al.* Risk stratification of adnexal cysts and cystic masses: Clinical performance of Society of Radiologists in Ultrasound Guidelines. *Radiology* 2017;285:650-9.
- Levine D, Brown DL, Andreotti RF, Benacerraf B, Benson CB, Brewster WR, *et al.* Management of asymptomatic ovarian and other adnexal cysts imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement. *Radiology* 2010;256:943-54.
- Ghosh E, Levine D. Recommendations for adnexal cysts: Have the Society of Radiologists in Ultrasound consensus conference guidelines affected utilization of ultrasound? *Ultrasound Q* 2013;29:21-4.
- Lee SI, Krishnaraj A, Chatterji M, Dreyer KJ, Thrall JH, Hahn PF. When does a radiologist's recommendation for follow-up result in high-cost imaging? *Radiology* 2012;262:544-9.
- Rosenkrantz AB, Xue X, Gyftopoulos S, Kim DC, Nicola GN. Variation

- in downstream relative costs associated with incidental ovarian cysts on ultrasound. *J Am Coll Radiol* 2018;15:958-63.e1.
10. Heller RE 3rd. Follow-up recommendations: The challenge, the opportunity and our future. *Pediatr Radiol* 2017;47:1721-3.
 11. Eisenberg RL, Bankier AA, Boiselle PM. Compliance with Fleischner Society guidelines for management of small lung nodules: A survey of 834 radiologists. *Radiology* 2010;255:218-24.
 12. Marshall AL, Domchek SM, Weinstein SP. Follow-up frequency and compliance in women with probably benign findings on breast magnetic resonance imaging. *Acad Radiol* 2012;19:406-11.
 13. Zarei F, Zeinali-Rafsanjani B. Assessment of adherence of diagnostic accuracy studies published in radiology journals to STARD statement indexed in web of science, PubMed & Scopus in 2015. *J Biomed Phys Eng* 2018;8:311-24.
 14. Ghimire S, Kyung E, Kang W, Kim E. Assessment of adherence to the CONSORT statement for quality of reports on randomized controlled trial abstracts from four high-impact general medical journals. *Trials* 2012;13:77.