World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(REVIEW ARTICLE)

Check for updates

The potential role in HIFU telehealth in the management of fibroid and adenomyosis after COVID-19 pandemic

Wu Shun Felix Wong [1,*], Yonghua Xu [2] and Lian Zhang [3]

[1] *School of Women's and Children's Health, The University of New South Wales, NSW, Australia.*
[2] *Department of Imaging and Interventional Radiology at Shanghai Xuhui District Central Hospital, Shanghai, China.*
[3] *State Key Laboratory of Ultrasound in Medicine and Engineering, College of Biomedical Engineering, Chongqing Medical University, Chongqing, China.*

World Journal of Advanced Research and Reviews, 2021, 09(02), 027–031

Publication history: Received on 15 January 2021; revised on 23 January 2021; accepted on 25 January 2021

Article DOI: https://doi.org/10.30574/wjarr.2021.9.2.0032

Abstract

We come to realize the importance of "telehealth" during the current COVID-19 pandemic. Telehealth can be defined as providing health care, including preventive, diagnostic, and treatment services, by using information and communication technologies such as videoconferencing, electronic messaging, and telephone calls (1). With the rapid development of new treatment technology, communication, and fast speed networks, not only telehealth can provide medical services closer to home, but it also should provide the doctors and patients with additional benefits of safety, effectiveness, and satisfaction. HIFU is a new non-invasive ablation treatment for many solid tumors. This paper illustrates how the potential practice of HIFU ablation for fibroids can be modified to make it suitable for doctors in their HIFU training for treatment of fibroids and adenomyosis and for patients who need surgery using this new telehealth development.

Keywords: HIFU ablation; Telehealth; Fibroid; Adenomyosis; 5G

1. Introduction

The Coronavirus pandemic has made history and revolution in medicine, not because it is a widespread pandemic infecting more than 25 million people; it also affects the way of life of healthcare providers and patients worldwide. During the pandemic, doctors are advised to reduce face-to-face appointments with patients who might display symptoms of COVID-19 infection, like cough, running nose, headache, and weakness (2, 3). Hundreds to thousands of patients requiring medical consultations and subsequent surgeries would not be allowed to enter hospital clinics or hospitals because all medical facilities are fully used to cope with the COVID-19 crisis. It is said to minimize the risks of cross infections due to overcrowding of high risks patients. While the traditional medical model requiring doctor-patient interactions in clinics and hospitals is severely affected, the medical systems in many western countries have reached a crisis.

The poor situations occur in women having a non-urgent gynecological disease such as fibroids and adenomyosis with heavy bleeding and severe anemia, adenomyosis with intolerable period pain, and many others. Non-urgent operations are postponed or canceled; even surgeries are indicated. Everything of the routine healthcare services appears to stop to provide services. Actions are taken in many countries to transform medical practice using telemedicine and telesurgery in clinics or sites outside the acute hospitals. Furthermore, this global pandemic on doctors' education and training has been affected at all levels and in all countries. Robson and Grabau, 2020 (4) further echoed that the impact

* Corresponding author: Wu Shun Felix Wong
School of Women's and Children's Health, The University of New South Wales, NSW, Australia.

of COVID-19 on medical education is unprecedented, far-reaching, and presents a great challenge. Most healthcare providers have realized that they have to adopt or initiate digital solutions (5).

The high-Intensity focused ultrasound (HIFU) ablation treatment is one of the latest developments, which is increasingly used to treat uterine fibroids, adenomyosis, and solid cancers (6-8). It is a local thermal ablation technique that destroys tumors by the thermal effect through the focused ultrasound energy generated from an extracorporal transducer. The ultrasound beams penetrate the body's tissues and are focused on the tumor to produce the maximal heat effect to induce coagulative necrosis. Some patients with fibroids, adenomyosis, or small solid tumors can have HIFU treatment under conscious sedation in an outpatient clinic (9). Nearly all patients tolerate the procedure well, and they spend 1 to 2 hours rest after HIFU ablation and return home in a couple of hours and back to work within days.

More importantly, the ultrasound-guided HIFU system enables doctors to operate on a computer console under direct ultrasound monitoring. Coupled with a high-speed internet environment, doctors can now learn HIFU therapy online, be supervised performing HIFU surgery via remote monitoring, and even expert HIFU surgeons can perform HIFU telesurgery via a high-speed 5G network.

From the beginning of the COVID-19 pandemic, the author has accumulated experience over a few months about using HIFU telehealth services via the social communication platform for his patients and training doctors. The following HIFU telehealth applications were taken and listed as follow

- Online medical consultations with patients. A preliminary exchange of information and arrangement of investigations, including blood tests and outpatient MRI scans, were conducted. However, due to the lack of agreed financial arrangement, and legal implications of online medical consultation, patients were still required to return for assessment before HIFU surgery.
- Distant teaching and learning of HIFU surgery from online presentations and discussion platforms were feasible and popular during the COVID-19 pandemic (Figure 1).
- The author adopted webinar meetings on HIFU up to 4-5 online overseas meetings a month. It is much more frequent and popular than conventional meetings that need him to travel.

Figure 1 A list of HIFU webinar meetings during the COVID-19 pandemic.

The well-known commercial platforms are Zoom, Skype, Microsoft team, Facebook…etc. This future communication technology enables doctors to learn the HIFU surgery at a site away from the hospitals or clinics to share patient's information and doctors' skills. Now online HIFU training and surgery demonstrations had available from some websites in China.

1.1. Monitoring and supervision of surgery at a remote location

There are inadequate HIFU experts because HIFU doctors take a long time (about 3-6 months) to get proficiency and become an experienced HIFU surgeon to operate without supervision. Their level of skill and knowledge is not easy to achieve. Therefore many doctors initially need supervision at centers that may not have HIFU experts to supervise.

Chongqing HAIFU Medical Technology Ltd has established a telemedicine center that provides a monitoring and supervision platform in a large room with multiple large monitors on the wall (Figure 2).

Figure 2: a telemedicine center at Chongqing HAIFU Medical Technology Company Ltd.

Doctors who were performing HIFU ablations for fibroids, adenomyosis, or other solid tumors from other remote centers, including Hong Kong, Taiwan, Singapore…etc. could have remote supervision by a training team of HIFU experts at this center. Doctors from new HIFU centers can then perform their HIFU ablation confidently with this backup support. When necessary, prompt teaching or advice was given over the audio connection. Real-time ultrasound images during HIFU ablation were monitored, with each step of the procedure supervised. That is a good model to be used across the globe for doctors' training and supervision in this new area of non-invasive HIFU surgery.

1.2. Remote surgical operation (via 5G network)

The possibility of operating HIFU remotely and utilizing an expert HIFU surgeon's technical skill over a long distance has attracted much attention. Coupled with China's rapid technology development, the authors had reported the world's first successful HIFU telesurgery through the 5G network on October 14, 2019, in Shanghai, China (Figure 3).

Figure 3 Dr. Xu conducted a HIFU telesurgery for fibroid ablations on a 30 km away patient.

When long-distance travel or mobilization may not be possible when there is another wave of COVID viral pandemic, remote HIFU telesurgery development will enable HIFU ablation to be completed in remote locations or clinics outside hospitals. Therefore any HIFU center in a hospital has a dedicated high-speed 5G network line, then remote cooperative HIFU treatment between it and a remote HIFU center can be possible.

2. Areas of future development

However, areas that must be resolved before remote HIFU telehealth services are popular and feasible.

i. Online medical consultation and assessment for the suitability of HIFU treatment should be encouraged. Apart from clinical histories, blood tests, and general fitness for surgery, the appropriateness and suitability for HIFU treatment depend on the MRI scan. Increased online medical consultations with the patients and online pre-operative assessment of their MRI images will reduce their need for multiple on-site medical consultations or travel to clinics and hospitals. This also empowers patients to select the most appropriate healthcare provider or hospital.

ii. Tele-monitoring and supervision of HIFU ablation at remote HIFU centers require the setting up of good clinical practice training, standard operating procedures, and close monitoring of treatment procedures. This will ensure the safety and effectiveness of HIFU treatment.

iii. For HIFU telesurgery to be practical, the following issues also have to be resolved

- Pre-operative or postoperative HIFU ablation management is equally important, but the advice may not be available in the remote area or neglected.
- The interference from electricity surges and machines broke down in any of the two collaborative sites could halt the operation or create unexpected sequels.
- Indemnity and legal coverage for HIFU telesurgery activities must be established. The legal responsibility for any unexpected adverse outcome arising from system errors must be resolved.

iv. The tele-clinical skill assessment: HIFU ablation system allows remote monitoring from a remote location (as discussed above). It thus enables the implementation of a new paradigm for clinical skill assessment. After completing HIFU training, doctors can perform the HIFU ablation under close monitoring for assessing their competency, accuracy, and skill at the time of HIFU ablation at a distance.

v. The tele-clinical trial – clinical safety and effectiveness of any new therapy require clinical trials for new treatment protocols. Various tele-trials programs have been successfully developed for cancer treatment trials closer to Australia's home (10). Similarly, the tele-clinical trial framework for HIFU ablation treatment for fibroids and adenomyosis can be an important development in the future.

3. Discussion

Today, we are at the crossway of a 'telehealth' revolution. Telehealth has gained acceptance across many healthcare services to deliver patients with care closer to home. It is expected that the telemedicine market is expected to rise. Suppose the surgical areas are to be further developed. In that case, the tele-HIFU system will be an appropriate telehealth application for training, supervision, assessment, and long distant HIFU treatment soon.

Before accepting HIFU into the "telehealthcare" on a broader scale, many other issues will need to be resolved. For example, the HIFU ablation should establish standard clinical protocols, global training, and compatibility of HIFU equipment must be developed. The known risks of hackers to create a risk of interference with communications networks or image signals need much attention. When security and privacy in a HIFU telehealth platform are being interfered with, it makes a bad image on record, interfering with accepting this new HIFU telesurgery.

Even before the end of this viral pandemic, we should be well prepared to cope with another viral pandemic in the future. We can therefore now think of it as a 'telehealth' revolution. HIFU is a new technology. After its incorporation with telehealth technology, we probably help lower the barriers among hospitals, doctors, and patients to prepare and improve patients' services despite any future viral pandemic.

As we can recognize HIFU telesurgery's potential increases, there will be business opportunities for communication companies and medical device manufacturers to embrace the HIFU telehealth revolution over the coming years. Future development, including additional AI solutions to incorporate into this HIFU ablation system, will improve the effectiveness and safety of its treatment and enhance overall patient satisfaction. Digital incorporation in HIFU ablation is an opportunity to drive the Industry for more development.

Finally, legal implications, patients' privacy, doctors' responsibility, network security, and machine reliability must be resolved before the widespread use of this area of HIFU development.

4. Conclusion

After the COVID-19 pandemic, we come to realize the potential role of HIFU "telehealth" to provide education, training, supervision, and remote telesurgery. HIFU technology and fast speed communication network development can provide this non-invasive treatment to women with fibroids and adenomyosis closer to home, with the benefits of safety, effectiveness, and patients' satisfaction. Even this ongoing pandemic shows that HIFU telehealth treatment for fibroids and adenomyosis had been increasingly used wherever the HIFU service is available. It does not have an increased risk of transmission of SARS-CoV-2 or other viral infection. Thus, HIFU telehealth could be the preferred treatment option in the future.

Compliance with ethical standards

Acknowledgments

We acknowledge the contributions of information from doctors involved in providing HIFU services and telecommunication services during the COVID-19 pandemic.

Disclosure of conflict of interest

All three authors are senior HIFU doctors teaching HIFU ablation techniques and have honorary affiliations with Chongqing HAIFU Medical Technology Company Ltd, Chongqing, China.

References

[1] Mathur J, Zammit G, Phelps G. Telehealth: call for formal clinical governance framework. InSight+. 2020.

[2] Rasmussen SA, Smulian JC, Lednicky JA, Wen TS, Jamieson DJ. Coronavirus Disease 2019 (COVID-19) and Pregnancy: What obstetricians need to know. American journal of obstetrics and gynecology. 2020.

[3] Ge H, Wang X, Yuan X, Xiao G, Wang C, Deng T, et al. The epidemiology and clinical information about COVID-19. European Journal of Clinical Microbiology & Infectious Diseases. 2020; 1.

[4] Steve Robson BG. How will doctors learn after the COVID-19 pandemic? InSight+. 2020.

[5] Keesara S, Jonas A, Schulman K. Covid-19 and health care's digital revolution. New England Journal of Medicine. 2020.

[6] Zhang L, Wang Z-B. High-intensity focused ultrasound tumor ablation: review of ten years of clinical experience. Frontiers of medicine in China. 2010; 4(3): 294-302.

[7] Orsi F, Arnone P, Chen W, Zhang L. High intensity focused ultrasound ablation: a new therapeutic option for solid tumors. Journal of cancer research and therapeutics. 2010; 6(4): 414.

[8] Liu Y, Zhang WW, He M, Gong C, Xie B, Wen X, et al. Adverse effect analysis of high-intensity focused ultrasound in the treatment of benign uterine diseases. International Journal of Hyperthermia. 2018; 1-6.

[9] Zhang L, Wong F. A high-intensity focused ultrasound surgery theater design in a private clinic. Gynecology and Minimally Invasive Therapy. 2020; 9(1): 1-5.

[10] Collins IM, Burbury K, Underhill CR. Teletrials: implementation of a new paradigm for clinical trials. Medical Journal of Australia.