MEDS Clinical Medicine (2023)
Clausius Scientific Press, Canada

DOI: 10.23977/medsc.2023.040311
ISSN 2616-1907 Vol. 4 Num. 3

Application of AR and MR Technology in Clinical Operation of Breast Cancer

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Keywords: *Breast Cancer, Clinical Surgery, AR, MR, Clinical Operation of Breast Cancer*

Abstract: Breast cancer has become one of the most common malignant tumors of women all over the world, which constantly threatens the health of women all over the world. According to incomplete statistics, there are about 249,000 new cases every year, and the incidence of breast cancer among women in China has always been high, making it the second highest incidence country in the world, second only to the United States. With the continuous development of computer technology, medical and clinical aspects are gradually becoming individualized and refined. Therefore, with the development of medical technology and information technology, lower-risk clinical surgery can be achieved to ensure the safety, effectiveness and efficacy of breast clinical surgery. Virtual technology has promoted the development of holistic medical technology, and the development of mixed reality (MR) technology and augmented reality (AR) has got excellent display and superiority in the whole medical clinical application, which makes virtual technology can be developed and applied in clinical teaching of breast cancer, which is the inevitable trend of the development of clinical surgery for breast cancer. In this study, through the application of MA and AR technology in breast cancer clinical surgery, and through its application in surgery and surgical clinic, it is expected that virtual reality technology will be integrated with clinical work to further improve the quality level of breast cancer clinical technology and promote the development of breast cancer clinical technology.

1. Introduction

About 60,000 people will die of breast cancer every year, and the mortality rate of breast cancer is constantly increasing, and it has become one of the cancers with a rapid increase in mortality in cities. Some studies have shown that more than 20% of breast cancer clinical palpation is the content of impression, which makes breast cancer continuously important and treated on the basis of low activity level, which makes its early judgment and treatment have important significance [1].

Nowadays, with the development of digital technology and the update of digital technology, people put real social activities into the real virtual environment. In addition to activities such as study and work, people also spend a large part of their time in events in the virtual world through

activities such as movies, which strictly exceeds the time in the real world to a great extent [2]. People's use of virtual reality equipment pushes the whole virtual reality technology to different fields. The development of all walks of life gradually has the application and development of virtual reality technology, which makes people immersed in it and easily realized, and promotes the continuous development of virtual reality to a certain extent [3]. The use of Head Mounted Display makes people's immersion easier to realize and promotes the development of virtual reality to a certain extent. With the continuous application and progress of virtual reality technology, MR and AR technologies have gradually become the focus of the development of virtual reality technology [4].

From the application of AR and MR technology in breast cancer clinical technology, through preoperative planning, surgical training and manual reduction, this study hopes that the development of virtual reality technology and breast cancer technology will be integrated, which will further improve the quality of breast cancer technology and promote the continuous development of breast cancer in medical level [5].

2. Research Background

2.1 Basic Overview of AR and MR Technology

AR technology originated from the head-mounted display device in 1986, which put the virtual information of the virtual world into the real world through computer-related technology, and displayed the application of the virtual world in a picture, and to some extent, it can combine the virtual and the real, and realize the integrated real-time interaction and three-dimensional expression (Figure 1)[6]. In recent years, in addition to the development of AR technology, MR technology is also developing rapidly with each passing day. It is a direct response of real space, which puts virtual space scenes, virtual spaces and users together to realize the overlapping of interactive information and immediate feedback. It makes it have the real presentation form of virtual reality and virtual three-dimensional space. The overall construction of AR technology is the perfect fusion of "real scene" and "virtual scene", which is a concrete expression of users' ability to perceive their surroundings. Therefore, we can know that MR technology is the integrated fusion of VR technology and AR technology, which makes the surrounding environment visible, and belongs to the overall enhanced version and strengthening measures of AR technology. Compared with AR technology, MR technology is a stronger one, and it contains (Figure 2)[7].

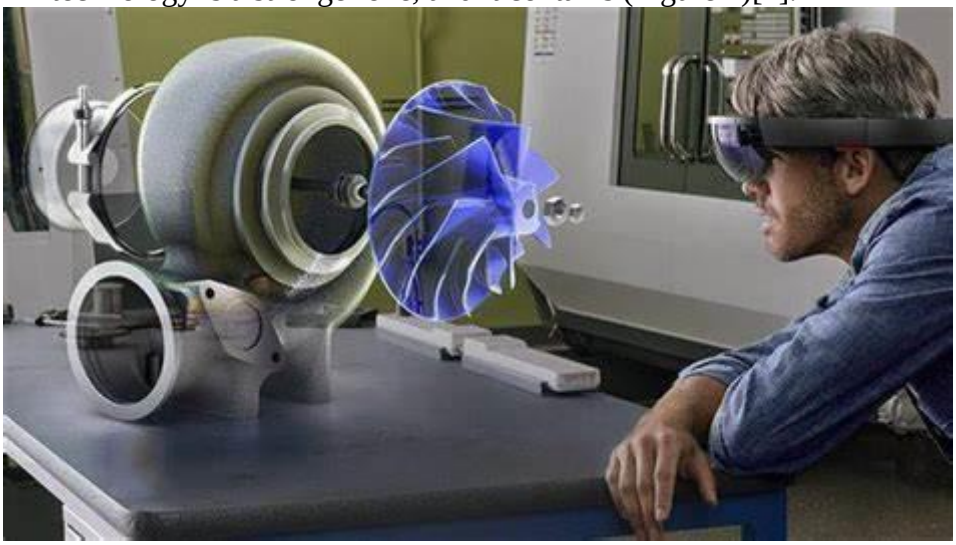

Figure 1: AR technical schematic diagram

Figure 2: Schematic diagram of Mr Technology

2.2 Technical Differences between AR and MR

MR technology is fundamentally the coupling of AR and VR technology, and it is an emerging technology that extracts their advantages and abandons their disadvantages. It can be regarded as the development of both technologies. Besides, there are some significant differences between them [8]:

(1) The difference between them lies in whether the book can clearly identify the position of the virtual object. The former has obvious distinction and identification, but the latter does not [9].

(2) The two can distinguish the difference between virtual and reality to a certain extent. AR can clearly distinguish and identify, but MR can't make obvious differences. In 2015, Magic Leap launched a movie with whales jumping out of the sea level as the main content, which made it impossible for people to effectively distinguish virtual objects from real objects in the film, although such videos can only be proved to need video special effects in the later stage [10]. It is not a real mixed reality method, but it has brought the research direction of MR technology development to mankind to a certain extent. It can be seen that although VR technology is illusory and cannot be confirmed, it brings the overall consciousness of users into the illusory natural environment. What technology can know is that both AR and MR will eventually form a complete development route and development needs, so it is impossible to cater to the technology in every scene in a single technology [11].

2.3 Application of VR, AR and MR Technologies

Nowadays, VR and MR technology have been applied to various professions, which are of great use in military affairs, training and professional teaching [12]. The use of virtual reality technology in real environment and application has promoted the development of VRAR (augmented virtual reality) technology, and people can freely use the development of the virtual and real world, which has attracted great attention. Nowadays, the development of many industries and professions is wandering between the combination of reality and reality, which makes the overall MR technology get great attention. At present, many experimental projects of audio-visual enhancement have emerged. Many experimenters have practical uses and applications in many aspects such as film entertainment. Adding virtual reality to the real environment has become the focus of people's

attention. The rapid development of science and technology has combined virtual reality with each other. People can also transform and use MR and AR at will. Nowadays, the latest hot spots and research progress in the application of MR and AR mainly focus on hearing and vision, which makes the whole research institution think that they have a market, but there is still some ambiguity in their market development and market concept in the future. In terms of vision, people think that AR and MR have a more market than the original VR, and the market concept between them is vague. This is because of the main market positioning and development of MR and AR, and it has a large development space. Nowadays, many enterprises are also keen to apply display technology to the core research and development, that is, the research and development of display panels. The overall display panel developers still stay in the large-scale industries, and the development opportunities left to the overall small industries and studios still have certain limitations. However, many companies around the world have begun to use MR and AR technologies. However, there are still some problems in the technical development of VR and MR, the main performance of which is that there are unlimited methods in the application field, and the actual use period is relatively short on the basis of the application function of the whole client, which makes the visual angle constantly enlarged. The situation of high price is gradually becoming the main line. In the development process of virtual reality technology, the development of Google and Microsoft is oriented to the rights and interests of all ordinary consumers, and finally turned to the overall demand of enterprise users. Ordinary consumers are discouraged from the high-quality demand for overall services, keeping the industry scale within a small range, and the laying of 5G technology has made Internet technology a well-formed cloud computing situation [13]. 5G technology can precipitate the computer technology into the internet boundary which is closer to the user's location, making it more suitable for the demand of high bandwidth and low energy consumption, which makes the internet demand provide an integrated opportunity for the development of AR and MR in the future. The overall advantage is that the power consumption output of equipment is reduced, the overall technical level is improved, the volume and overall weight of equipment are continuously reduced, and the overall production cost is reduced, which gradually provides a new seal for the development of AR and MR equipment, making it mixed reality and virtua (Figure 3) [14].

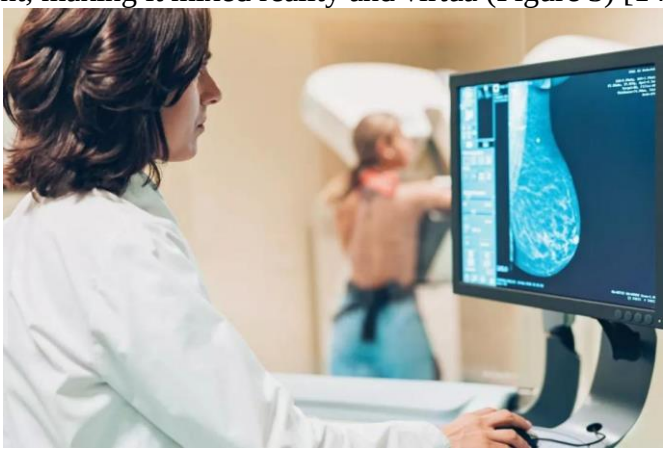

Figure 3: Application of Mr and AR technology in specialty

3. Application of AR and MR Technology in Clinical Operation of Breast Cancer

In the development of MR technology and AR technology, VR technology has been widely used in the identification of breast cancer symptoms and the application of breast cancer clinical surgery. In addition, it can also relieve the overall depression and anxiety of patients, relieve their pain, reduce related symptoms, reduce the occurrence of injury complications and improve their

cognitive dysfunction. Its main application methods are to improve virtual scenes, which can be provided in MR and AR technology [15]. It is used for the overall health education of patients, so that patients can have a deeper use of health. In the existing research, patients with breast cancer can intuitively and effectively observe the treatment environment through the display screen by using radiotherapy technology and relying on the 18-week MR treatment plan, so that the treatment can be more effectively integrated and improved, and the treatment path can be strengthened. The tumor of breast cancer can be located in the patient's heart, breast and various surrounding anatomical structures, and the whole 3D visual effect is used to change and influence the radiation dose, so that the radiation depth can be guaranteed and visualized, thus enhancing the patient's understanding of the whole radiotherapy system, strengthening the patient's cognition of its disease and the overall satisfaction measures of cancer treatment[16]. In other aspects, the whole virtual scene can reduce the negative emotions of patients. In this study, 94 patients with breast cancer were treated with AR and MR, and treated with standard group. The treatment with AR technology experienced different levels of virtual scene judgment by exploring animal climbing and swimming. The results showed that VR technology was beneficial to improve depression, fatigue and other forms, and patients could participate in it all the time, so as to achieve the purpose of rehabilitation training, and make the whole rehabilitation training action gamified, so that subjects could expand the training of virtual games while making a breakthrough in the game, and improve the range of motion of the whole shoulder joint (Figure 4)[17].

Figure 4: Virtual technology improves patients' communication depression in medical treatment.

In the overall effectiveness of patients' rehabilitation training, the situation of rehabilitation training is conducive to the mixed service of ability and function, which makes the rehabilitation training of breast cancer patients improve continuously, limits the space and environmental factors, improves the overall training plan, makes patients easily feel overall burnout, and makes patients' rehabilitation training begin to decrease. Diversified virtual environment can promote the reshaping of nerves and strengthen the overall movement and learning. In order to continuously improve the training environment for patients, so that patients can carry out autonomous training, some researchers have divided breast cancer surgery into four stages, and according to them, they have introduced and designed corresponding MR and AR technologies, so that patients can complete the overall training and rehabilitation and the continuous selection of physical condition by watching 3D rehabilitation exercises, and the overall collection of somatosensory facilities can improve the standard data and exercise data of patients and carry out intervention after three months. Uploading the standard data of rehabilitation training and physical condition, in the process of virtual reality exercise, the overall exercise intensity is increased, and it is constantly adjusted according to the patient's tolerance [18].

When using intervention therapy, AR and MR can reduce the chronic pain of female breast cancer patients who receive standard treatment and VR intervention in breast cancer technology, which can distract patients' attention to some extent, break their overall obstacles and fears of exercise, promote the overall limb recovery of patients, and can alleviate the pain of cancer patients as a whole. The whole VR rehabilitation training provides a rich entertainment and competitive environment for patients, which breaks the obstacle of fear of exercise as a whole, but it may also lead to adverse reactions such as drug addiction, which improves their adverse reactions to drugs and improves patients' acceptance of treatment.

The overall form lacks certain interest, which specifically reduces the learning initiative of medical officials, which enables it to improve the overall clinical teaching results, especially for improving traditional teaching methods, which can greatly improve the learning and reduce the learning initiative of medical students, and the clinical teaching effect is not good (Figure 5).

Figure 5: The first MR scanner in the world

Doctors need to master the anatomy around the lesion to avoid the occurrence of overall complications, but for young doctors, the overall reduction experience is insufficient and the overall success rate is low, so it is necessary to strengthen the simulation training on the platform on weekdays to meet the overall technology of MR and AR, and professional training to meet this skill is needed (Figure 6)[19].

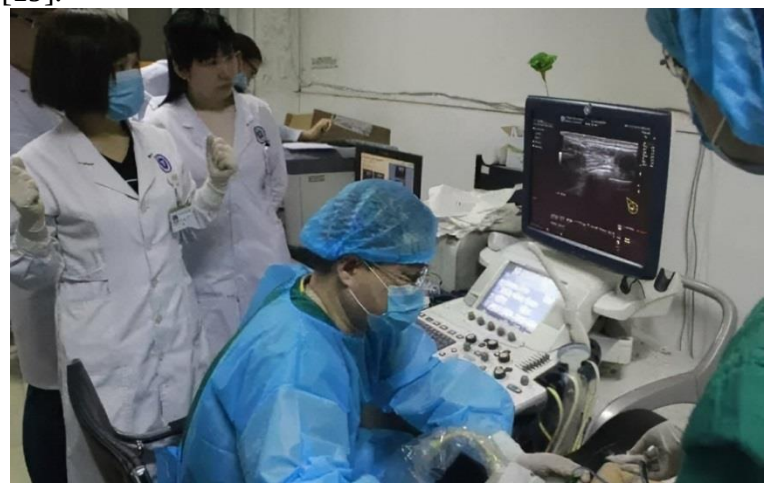

Figure 6: Clinical observation of breast cancer

In the development of information synchronization, the actual suffering is solved. For various factors, planning is an important influencing factor, which can make doctors have the overall ability training before operation, ensure their information synchronization to a certain extent, and solve the

related mechanism research. In the operation process of Zhengi, the cultivation of surgical ability and whether the operation can be successfully completed are determined by many factors. At the same time, when doctors train their planning ability again, the direct way to solve the problem and improve the safety and effectiveness of the whole operation. Similarly, by simulating virtual surgery technology for patients, the technology can be completed, and various technologies can be continuously improved to realize the research and development of the ability training platform and improve the surgical standards of trainees (Figure 7).

Figure 7: Schematic diagram of the application of virtual reality technology in clinic

Virtual reality technology can improve the situation that only a part of the anatomical structure in the picture can be seen, which will make the doctor's understanding of surgery not deep enough. With the minimally invasive improvement of orthopedic surgery, with the help of virtual reality technology, related problems can be fundamentally solved, so that students can continue to learn and develop to a certain extent. This is the core of breast cancer surgery clinic and an effective way to improve breast cancer surgery teaching.

4. Summary

Breast cancer surgery is the most common malignant tumor in women's diseases, and the use of related virtual reality technology is the core to realize the overall surgical development. Through the application of MA and AR technology in breast cancer clinical surgery and its application in surgery and surgical clinic, it is expected that virtual reality technology will be integrated with clinical work to further improve the quality level of breast cancer clinical technology and promote the development of breast cancer clinical technology.

Acknowledgements

This article is supported by the Xi'an Science and Technology Plan Project - University Institute Science and Technology Personnel Service Enterprise Project "3D Digital Reconstruction and Application of AR/MR Technology in Medicine" (Project No. 22GXFW0144).

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