

BRACHYTHERAPY AND EMOTIONAL SUPPORT - A SHORT REVIEW

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ABSTRACT

Cancer is still a serious problem in the whole world. Both in developed countries, and even more so in still developing countries. Cancer is a group of diseases caused by cells singles growing abnormally and uncontrollably so that it can become a malignant tumor that can destroy and damage healthy cells or tissues. Cancer can occur anywhere, from various tissues, and in various organs. As it grows and reproduces, cancer cells form a mass of malignant tissue that infiltrates into the nearby tissue (invasive) and can spread (metastasize) throughout the body. Despite decades of basic and clinical research and trials of promising new therapies, cancer remains a major cause of morbidity and mortality. Brachytherapy is known in the specific form of radiotherapy in which radioactive sources are precisely placed directly into or close to the tumor. This kind of treatment is highly recommended to patients that having various sorts of cancers. It is the best instrument for delivering extremely large doses that focused on the focal tumor while limiting the risk towards normal tissue. This article reviews the brachytherapy of clinical relevance, with an emphasis on indications, levels of evidence, and outcomes for the overall content of radiation used by cancer patients. Besides that, emotional support is more important for patients because it can provide additional energy, especially from their families. Therefore, in conclusion, emotional support is very important for patients so that in the end the patient can have a better life expectancy.

ABSTRAK

Kanser masih menjadi masalah serius di seluruh dunia. Baik di negara maju, dan lebih-lebih lagi di negara yang masih membangun. Kanser adalah sekumpulan penyakit yang disebabkan oleh sel tunggal yang tumbuh secara tidak normal dan tidak terkawal, sehingga boleh menjadi tumor ganas yang boleh memusnahkan dan merosakkan sel atau tisu yang sihat. Kanser boleh berlaku di mana-mana, dari pelbagai tisu, dan dalam pelbagai organ. Apabila ia tumbuh dan membiak, sel-sel kanser membentuk jisim tisu malignan yang menyusup ke dalam tisu berdekatan (invasif) dan boleh merebak (metastasis) ke seluruh badan. Walaupun berdekad-dekad penyelidikan asas dan klinikal serta ujian terapi baharu yang menjanjikan, kanser kekal sebagai punca utama morbiditi dan kematian. Brachytherapy dikenali dalam bentuk radioterapi khusus di mana sumber radioaktif diletakkan secara tepat terus ke dalam atau dekat dengan tumor. Rawatan sebegini amat disyorkan kepada pesakit yang menghidap pelbagai jenis kanser. Ia adalah instrumen terbaik untuk menyampaikan dos yang sangat besar yang memfokuskan

pada tumor fokus sambil menghadkan risiko terhadap tisu normal. Artikel ini mengkaji tentang brakiterapi perkaitan klinikal, dengan penekanan pada petunjuk, tahap bukti dan hasil untuk kandungan keseluruhan sinaran yang digunakan oleh pesakit kanser. Selain itu, sokongan emosi lebih penting kepada pesakit kerana ia dapat memberikan tenaga tambahan terutamanya daripada keluarga mereka. Oleh itu, secara kesimpulannya, sokongan emosi amat penting bagi pesakit agar pada akhirnya pesakit dapat mempunyai jangka hayat yang lebih baik.

Keywords: cancer, brachytherapy, emotional support

INTRODUCTION

Cancer is a disease that is not infectious, but chronic in the development of the etiology of the disease. In other words, cancer is a disease of the formation of DNA chromosomes found in the nucleus of the cell [1]. The disease looks like it is growing flesh or substance abnormally in our bodies and cause serious injury great and oozing pus. Cancer cells have a variety of shapes and colors kinds, this is caused by the level of nucleic acid in the nucleus being very high. There are many types of cancer. For example, there are blood cancer, cervical cancer, bone cancer, breast cancer and others.

Brachytherapy is a type of cancer treatment that uses a specific type of radiation therapy. It entails placing sealed where the sources of radioactive will insert into or around the treated tumor either directly or must undergo catheters. In addition, this radiotherapy has been used in antineoplastic treatments since the early 1900s, where contact brachytherapy has been developed. Pierre Curie and Alexander Graham Bell both observed shrinkage of the malignant tumors at the time when the source of radioactive directly implanted inside a mass [2]. The observation has been made after a few years of discovery of radioactivity. Brachytherapy has become one of standard care since the mid-twentieth century, which act as a single modality or as an improvement for cancers in external-beam radiotherapy (EBRT) that commonly required a high dose of radiation to treat cancer [3].

Brachytherapy has been excellent radiotherapy in 2019 where it is suitable for patients that need to be exposed to the radiation and it has wide rangeability involvement in specialization medical either in a referral or brachytherapy placement. The therapeutic importance of brachytherapy in the global oncological landscape is reviewed, which considers possible improvements in local control, survival, quality of life (QOL), treatment sequelae, and value-based evaluation.

Many patients utilise brachytherapy as their primary treatment, including those in cancer care. Thus, based on high-level data from controlled randomised studies, brachytherapy primarily points to 1) patients that have advanced cervical cancer in a combination of chemo-radiation, 2) patients that have surgical uterine endometrial cancer that able to minimize the risk recurrence of the vaginal vault. 3) patients that having prostate cancer with high- risk which needs to fulfill the dose of escalation including improvement in progression-free survival (PVS) and 4) patients that having breast cancer which able to boost partial breast irradiation.

Cancer treatment can be done using radiation therapy or chemotherapy. It takes a very long time so it can also have an impact on the sufferer. An example is hair loss, nausea vomitus, and others. Therefore, they need support to be able to provide additional energy for them so that they can support the treatment process. Emotional support is described as behavior that convinces the individual that he or she is loved and valued regardless of achievement [4-5]. Having emotional support from family, friends and the environment can help during the cancer treatment. This has an impact on the psychology of sufferers so that when they are getting better support, they will be more enthusiastic about getting healed.

MODALITIES OF BRACHYTHERAPY TREATMENT

There are three major situations in radiation therapy which are: 1) as therapeutic, radiotherapy either with or without chemotherapy; 2) as an adjuvant treatment to minimize the probability of local relapse especially after performing the surgery; and 3) for symptomatic metastases that will act as palliative treatment. Commonly, the objective in all techniques of irradiation is to ensure the tumor has enough dose of radiation that is important to remove cells of tumors instead of damaging the normal tissues. The primary target for therapeutic irradiation is known as the deoxyribonucleic acid (DNA) chain, therefore damaged radiation-induced DNA must be repaired which will directly lead to cell death, redistribution of the cell cycle and changes in the microenvironment. The difference between tumors and normal tissue usually relies on irradiation therapeutic index, which capability for tumor cells repair the DNA is lower compared to normal tissue cells. Although, when the induced radiation changes in organs it will cause acute side effects and also functional sequelae in the long term. Thus, in cases to ensure the tumor delivers to the organ with low therapeutic doses, there should be an ideal technique to minimize the risk [6].

In addition, there are two possibilities to deliver therapeutic irradiation which are external-beam radiotherapy and brachytherapy. The technique that is commonly used in EBRT is patient externally receiving the irradiation that comes from beams. Nowadays, there are many modalities of modern EBRT, for example, intensity-modulated radiotherapy (IMRT), proton therapy and radiotherapy of stereotactic which all of the techniques can raise the ratio between the dose of tumor and dose of normal tissue. Whereas, brachytherapy relies on the source of radioactive implantation that has been guided by clinical findings including any modality of relevant imaging. The implantation of radioactive sources usually within the tumor is known as interstitial brachytherapy or next to the tumor which is called plesiotherapy. Thus, in some cases, medical specialties such as cardiologists, surgeons, dermatologists, urologists, pneumologists and etc. are needed to ensure the brachytherapy catheters are precisely in their perioperative placement.

On the other hand, if cases such as there is a difficulty for target volume to access without the guidance from endoscopic for example esophageal or endobronchial tumors, including the cases that proximity to organs with great sensitivity, this multidisciplinary approach is needed to handle those perioperative procedures. Thereafter, imaging is used to guide the process of dosimetric which can select where to be positioned and/or how long the sources should stay in that place. This process usually will produce a high dosage to the tumour but does not exceed the limited dose, especially for risk organs. Three total doses can be delivered to the patients either through: 1) Irradiation at a low dose rate (LDR) for a long time, 2) Pulse-dose- rate irradiation that repeatedly every hour in a few days with low-intensity pulses, or 3) Irradiation at a high dose rate (HDR) for a few fractions. In modern brachytherapy, it used various types of radioisotopes such as iridium-192, cobalt-60, iodine-125, and palladium-103 due to its specific half-life properties and the usage of energy [7].

ADVANTAGES OF BRACHYTHERAPY TECHNIQUES

The tumor that directly delivers the high dose of radiation can ensure brachytherapy's efficacy. There are many advantages offered by brachytherapy such as it has a sharp dose of radiation gradients if compared to techniques of external-beam. Brachytherapy also will minimize surrounding tissues from being exposed to a dose of radiation which fall-off of the rapid dose will occur at distance from sources. Moreover, brachytherapy's radiation sources can move as the movement of the tumor during the procedure of this technique which additional uncertainty margins are unnecessary to the near clinical target volume compared to conventional EBRT that need to consider the uncertainties motion of organ [8]. As a result, brachytherapy patients will receive the lowest integral dosage which has combination with optimum tumor-to-normal tissue gradients.

However, if compared to schemes radiation of protracted fractionated, brachytherapy treatment can be administered in a few days, which is therapeutically useful in proliferating tumors that can reduce the overall time for treatment and hence minimize the tumor repopulation can improve the local control of the treatment [8]. Brachytherapy dosimetric studies, it has indicated that this treatment is known as an ideal method for achieving high tumor doses when used in conjunction with radiation since it can reduce the exposure towards the risk organ [6-8]. To cure the advanced primary tumors, for example, cervical cancer and prostate cancer, it needs

treatment with high doses brachytherapy is a significant treatment since it can use either alone or with the combination EBRT [9].

GLOBAL ONCOLOGICAL LANDSCAPE OF BRACHYTHERAPY

Endometrial Cancer

In this cancer, the brachytherapy of postoperative commonly consists of an applicator that has been placed between the vaginal cavity. It is important to irradiate the vault of the vaginal with the vaginal canal up to 2 to 3 cm and its depth 5 mm. The goal of this treatment is to avoid the recurrence of vaginal and to sterilize any remaining cells in the vaginal vault. Volume irradiation used in the treatment is very tiny and the overall dose is modest making it well tolerated and giving acute and minor side effects such as cystitis, proctitis, etc. In endometrial cancer, the role of brachytherapy in surgically treated patients has been thoroughly documented due to being well-conducted in clinical trials. These trials have been designed which can decrease the morbidity in radiotherapy. From past research, they have looked into the feasibility of substituting postoperative (EBRT) with vaginal vault brachytherapy alone in the event of intermediate-risk endometrial cancer [10-11]. For EBRT, it was able to reduced pelvic recurrences when compared to vaginal vault brachytherapy alone, but it had no effect on survival and had a negative impact on the quality of life and overall health of patients. The negative effects of EBRT were primarily due to intestinal morbidity. The postoperative treatments have been refined thanks to these randomized investigations.

Head and Neck Cancer

This kind of cancer involves body parts such as the lip, mobile and basal tongue, mouth floor, oral mucosa and etc. This treatment is available to used brachytherapy either alone or combines with other treatments for example surgery and/or external-beam radiotherapy depends on the size of tumor, the location of tumor including involvement of lymph node. For preserving salivary function, the brachytherapy method is known as the first-choice radiation [12]. More than 90% of patients who have lip malignancies are thought to be appropriate candidates for brachytherapy, which provides the greatest functional and cosmetic outcomes. Thus, it gives the rates of local control about 90% to 95 in all stages. The acute reactions after the treatment are frequently severe and necessitate local analgesics for several weeks. However, after the phase of healing, it shows an excellent result for long-term function.

EMOTIONAL SUPPORT

Cancer or malignant tumor is a disease that occurs due to the growth of body tissue cells that are not normal. Cancer can be caused by various factors, one of which is lifestyle factors. American Cancer Society predictions on 2030, cancer cases will increase to 21,400,000 people in the world and 13,200,000 people in the world will die because of cancer. In general, each type of cancer has its own stage. Stages 1 and 2 are early stages with a good prognosis and stages 3 and 4 are advanced or late stages that have a very poor prognosis. The types of treatment that can be done for patients with cancer are chemotherapy, surgery and radiotherapy.

Emotional support is one of the important things in the healing process of patients, especially for cancer patients. Besides being caused because cancer is a disease that is classified as severe, there are also other factors that cause patients to need a lot of emotional support, especially from family. For example, the anxiety level of cancer patients is so high due to anxiety in facing therapy, anxiety due to being diagnosed with a serious illness, anxiety about the future, and others. This anxiety can hinder the patient's healing process, so support for the patient must always be increased.

Anxiety is a feeling of fear either realistically or unrealistically accompanied by an increase in psychological reactions [13]. The level of anxiety is divided into two which are the moderate level of anxiety (adaptive response) and severe level of anxiety (maladaptive response) [14]. Aspects of anxiety can be classified into three types of reactions, namely emotional reactions, cognitive reactions and physiological reactions. Emotional support is a form of behavior that is shown by respecting one's personality, loving someone, convincing someone that he is still surrounded by good people, keeping one's feelings and others in addition to his achievements.

Relations between emotional support with healed from patients cancer

The family is one of the main support systems in helping to provide care to patients so that it is expected to prevent recurrence [15]. Emotionally, family support becomes a very important need for each member and is included in the form of preventing psychological problems in cancer patients [16].

In addition, the function of the family is also as a caregiver for patients, especially in providing encouragement and motivation. The support and assistance provided by family members as part of the patient's closest person are expected to be able to have a major influence on patient compliance in taking treatment, foster a sense of optimism, and also assist in solving the problems they are facing so as to improve the quality of life of the patient. At least the ideal social support is divided into 4 forms of support, namely,

Emotional support, namely support given in the form of empathy

Appreciation support, namely support given in the form of positive disclosure

Informative support, namely support given in the form of advice

Instrumental support is the support that is given directly

Patients with a cancer diagnosis will find it easier to feel hopeless. Therefore, the influence and benefits of the presence of the family as a support provider, both social and emotional support, are needed. In the study of patients with gynecological cancer, it was found that social support had a significant effect on decreasing hopelessness and anxiety. Another study that shows the results that social support plays an important role in healing cancer patients is in the study of patients with lung and breast cancer. The results show that patients who receive good social support will have a lighter level of hopelessness and even decrease despair along with increased social and emotional support provided by the family.

Emotional support for patients with breast cancer is very important because many of these patients with breast cancer feel depressed, afraid, shocked, sad, angry and difficult, or even unable to accept the situation. There is a correlation between family support and increased self-confidence in breast cancer patients [17]. In addition, there is also a relationship between family support and the patient's level of anxiety. The higher the patient's family support, the lighter the level of anxiety experienced by the patient.

Anxiety experienced by cancer patients who are undergoing treatment will have an impact on the psychological and physiological state of the patient. Of course, this can affect the effectiveness of the treatment process that is being undertaken. Therefore, the emotional support shown by family members will greatly help the patient's healing process. At least, the patient will feel calm, comfortable, feel loved, and have other positive feelings that will help prevent the patient from negative emotions and excessive anxiety.

In the treatment process, the role of the family is also very important for the patient's recovery. One of its roles is as a provider of information and strategies for healing, changing emotional patterns, ways of life, providing spiritual guidance and assisting in meeting daily needs.

Some patients even said that those who received support from their families made them feel loved and appreciated, which motivated them to get well soon. In addition, family support both socially and emotionally can also increase the patient's self-esteem so that it can increase positive coping mechanisms.

From the results of several studies that have been carried out, it can be concluded that there is a relationship between the emotional support provided by the patient's family to the patient himself. The higher the emotional support provided by the family, the lower the anxiety, fear, and hopelessness suffered by the patient. Vice versa, the lower the emotional support given to the patient, the higher the feeling of anxiety, fear and hopelessness.

Patients who receive social and emotional support from their families will feel comfortable, peaceful and loved [17]. More specifically, the existence of adequate emotional or social support has been shown to have a relationship between the two. Mortality rates can decrease and patients become easier and faster to treat. Family support is one of the factors that can help in coping with stressors. In essence, there is a close relationship between families who care for cancer patients and the fulfillment of biological, psychological, social, and spiritual needs [18]. Patients who are supported by family members will feel cared for, loved, felt valued, can easily share the burden, increase self-confidence, and build expectations to avoid or reduce stress.

Cancer is a disease that arises due to abnormal cell growth as a result of damage to genes that regulate cell growth and differentiation [19]. These growing cancer cells can spread to various other parts of the body so that it can endanger the patient's life. Thus, for future review, brachytherapy should combine tailored medical oncology and radiological tools in the future including the usage trends of brachytherapy advancement of technological and clinical evidence [20-23]. In order to maximize patient care, policies of health care and insurance providers should be supported, thus it may cause all patients to have the probability of receiving standard therapy or has the ability to choose various types of therapeutic options. Patients diagnosed with cancer usually need a lot of support from various parties. One of them is from the family. Anxiety, fear, and hopelessness are some of the main problems that commonly arise in cancer patients. Therefore, the role of family members is very necessary at times like this. Emotional support is a form of love, empathy and concern for the person concerned. The emotional support provided will have an impact on increasing self-confidence, self-esteem, motivation, and also improving the patient's coping mechanisms.

CONCLUSIONS

In several clinical scenarios, brachytherapy is indicated as a sole treatment or in combination with other treatment modalities either surgery or external radiotherapy with strong evidence that it has a position in the global oncological landscape. A variety of specialties physicians are engaged in the process of brachytherapy, including patient referral, brachytherapy installation, and post-treatment management after the surgery for example follow-up and complication treatments or if any. Several efforts have been undertaken to bring brachytherapy to the highest level of modernity and increase the therapeutic index through incremental advances. Therefore, emotional support becomes very important in helping support the patient's recovery. At least the patient can have the enthusiasm to return to routine treatment and try to fight the disease. From several studies that have been conducted, the fact is that there is a relationship between the emotional support of the patient's family for the patient with a cancer diagnosis. One of the pieces of evidence is that patients who are given emotional support

by their families can reduce anxiety, fear, and hopelessness so that they can increase life expectancy and improve the patient's coping mechanisms.

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