

سرطان الحنجرة في ليبيا

■ د. فاطمة عيسى* ■ أيوب ليحيو** ■ تهاني الدهروي***

المستخلص:

سرطان الحنجرة يصيب أكثر من 12000م12 شخص سنويا ويسبب الوفاة لحوالي 3700 من المصابين به (1). سرطان الحنجرة يمتلك احتمالية كبيرة للعودة بعد شفاء وتعافي المريض تبلغ حوالي 3 سنوات.

هدف هذا البحث إلى دراسة سرطان الحنجرة بليبيا حيث شملت الدراسة عمر وجنس المرضى وكذلك طرق تشخيص وعلاج المرضى المتبعة في ليبيا. هذه الدراسة كانت دراسة إحصائية وقد تم تجميع كل البيانات من ملفات مرضى سرطان الحنجرة من قسمي الأشعة العلاجية بمستشفى طرابلس الطبي ومستشفى طرابلس المركزي بمدينة طرابلس.

وقد توصل هذا البحث للنتائج التالية:

1. أن سرطان الحنجرة يصيب الرجال أكثر من النساء في ليبيا. ويصيب الفئة العمرية الأكبر من 60 سنة.
2. أن أكثر حالات لسرطان الحنجرة سجلت في 2009.
3. أن أكثر طرق التشخيص التي استخدمت لتشخيص سرطان الحنجرة في ليبيا كانت بأجراء CT ثم أخذ عينة .
4. أما أكثر طرق العلاج التي أتبع في ليبيا في كلا المستشفيات كانت العلاج الإشعاعي التقليدي ثنائي الأبعاد باستخدام جهاز الكوبلت - 60.

* عضو هيئة تدريس بقسم الأشعة التشخيصية والعلاجية بكلية العلوم والتقنيات الطبية، طرابلس وأخصائي فيزياء طبية بقسم الفيزياء الطبية والاشعاعية بمركز طرابلس الطبي، طرابلس، ليبيا..

** قسم الأشعة التشخيصية والعلاجية بكلية العلوم والتقنيات الطبية، طرابلس، ليبيا.

*** قسم الأشعة التشخيصية والعلاجية بكلية العلوم والتقنيات الطبية، طرابلس، ليبيا.

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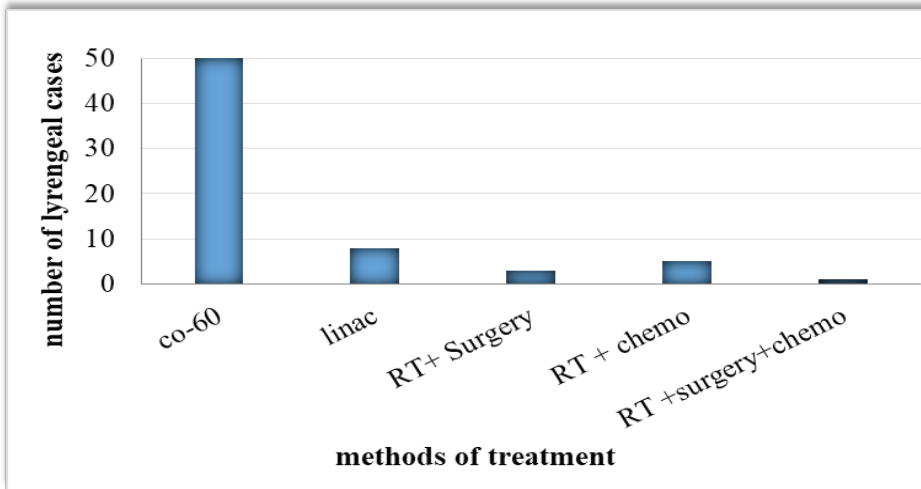


Figure 4. Demonstrates the methods of treatment of laryngeal cancer in TMC and TCH.

5. Conclusion:

The research aimed to study the laryngeal cancer in Libya including ages and sex of patients and the methods of treatment and diagnosis followed. The data was obtained from the files of patients from the department of radiotherapy at TMC and TCH, Tripoli, Libya. The results demonstrated that the number of females of laryngeal cancer less than the number of males of laryngeal cancer. The greater number of cases was registered in 2009 and no cases were found in 2013, 2014 and 2015, because in 2009 Co-60 unit in TMC and TCH and the Precise- linac were working, while in 2013, 2014 and 2015 the Co-60 unit in TCH only working. Most patients of the laryngeal cancer were in the age of 60 years old and older. The most method of diagnosis followed was the biopsy and CT. The 2D conformal radiation therapy using Co-60 was the most methods of treatment used for the laryngeal cancer in Libya, because during the time of study the both linacs in TMC were not working, due to the installation and upgrading purposes.

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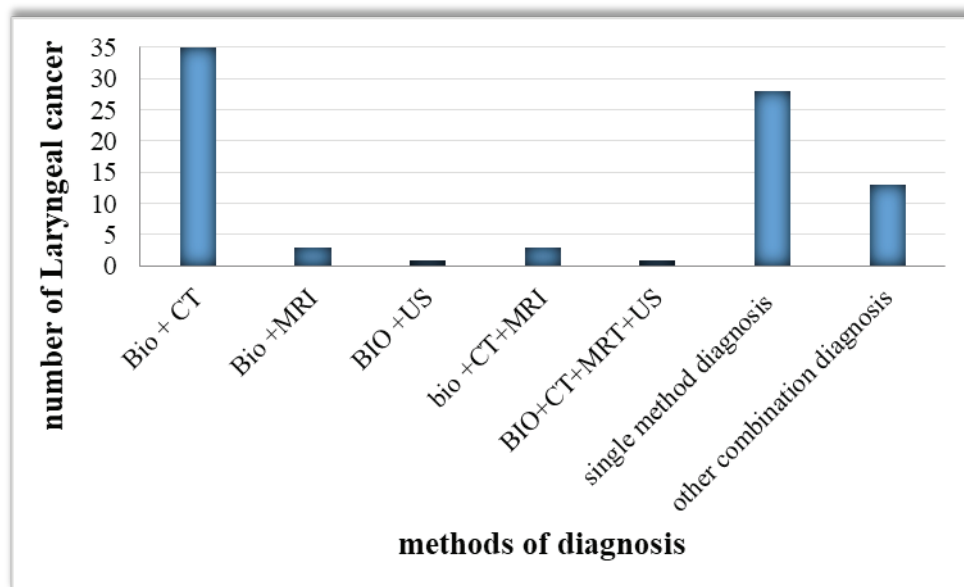


Figure 3: Shows the methods of diagnosis for laryngeal cancer followed in TMC and TCH

The methods of therapy followed in TMC and TCH for the laryngeal cancer were radiotherapy as a single treatment using Co-60 (in TCH) and linacs (in TMC), or a combination of treatment methods of radiotherapy, chemotherapy and surgery as shown in the figure 4. The 2D conformal radiotherapy represented the most treatment method used in Libya, while the lowest method followed was the combination of chemotherapy, surgery and radiation. Figure 4 illustrates that number of patient who treated by the radiation therapy using Co-60 was higher than those treated using linacs. Because, even there are two linear accelerators in TMC; Synergy and Precise, but the Precise-linac that was installed in 2005, stopped working since 2009 till 2016 because, it was upgraded and required commission tests and verifications post the upgrading to be ready for clinical use. Regarding the Synergy-linac, which was, installed in 2013, but due to the commission and verification procurers, it began working in 2016. While, Co-60 unit that was available in both TMC and TCH, but, the Co-60 unit that available in TMC was stopped since 2012 because the source has passed the required half-life for the treatment application (its activity became less than 2/3 its initial activity) as explained in details in section (1.3.1.1).

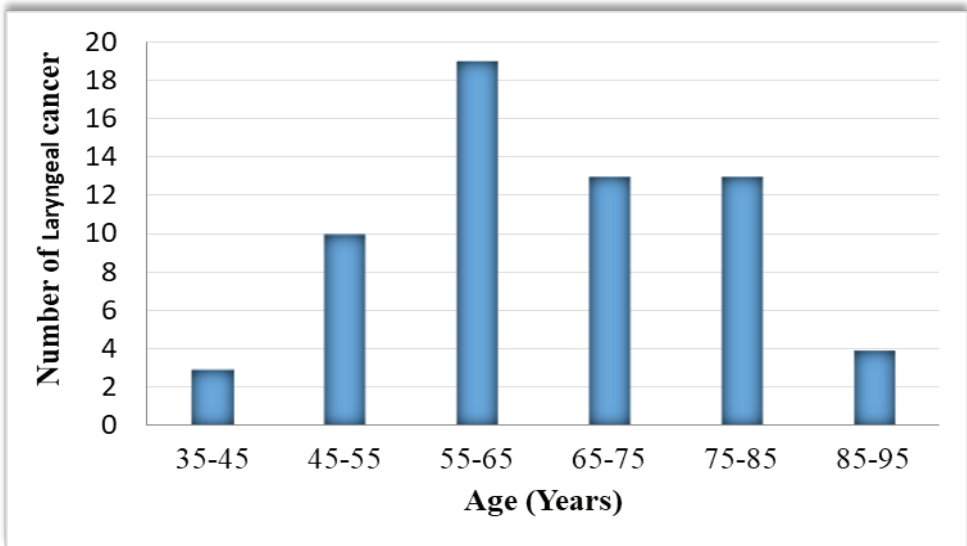


Figure 2: Illustrates ages of patients of laryngeal cancer in the department of radiotherapy at TMC and TCH.

Figure 2 demonstrates the ages of patients of laryngeal cancer registered in the department of radiotherapy in TMC and TCH since January 2008 till June 2016. The ages of the cases were from 36 to 90 years old. The greatest number of cases was in the age of 60 to 85 years old and the lowest number of cases was in the age of 35 till 45 years old, this finding was in line with [3], which said that the laryngeal cancer is common in people over 60 years old.

Methods of diagnosis of laryngeal cancer followed in TMC and TCH are illustrated in the figure 3. Several diagnosis methods were used in both hospitals, depending on the stage of the tumor and the situation of the case including, biopsy, CT, MRI, and ultrasound, as a single method of diagnosis (such as CT or biopsy only). However, other combination diagnosis methods (in the figure 3) mean one of the following: x-ray + ultrasound cervical sonogram + Biopsy, x-ray + CT, x-ray + CT + biopsy, CT + Ultrasound + x-ray, CT + nephoscopy, x-ray + us, CT + Ultrasound + Bio, CT + MRI, Laryngoscopy + Biopsy + CT, CT + Biopsy + endoscopy, CT + Laryngoscopy). Figure 3 demonstrates that the majority of laryngeal cancer cases were diagnosed by taking biopsy then performing CT, this result is in agreement with [2,8] and as explained in section 1.1. Lowest cases were diagnosed with biopsy + ultrasound and biopsy + ultrasound + CT + MRI.

from TCH and TMC for the period time (January 2008 – June 2016). Two cases were females (one from each hospital) and the rest was males, this results is in agreement with [3,4]; both demonstrated that the cancer of larynx is less common in women than men. In addition, the reason of that the majority of laryngeal cancer patients in Libya was males might refer to the cigarette smoking, this is also in agreement with [6,10], which illustrated that the cigarette smoking, highly increases the risk of the laryngeal cancer and effects badly the response to the treatment. In Libya, most the cigarette smokers are men due to the Libyan custom.

The number of laryngeal cancer patients have registered in the department of radiotherapy in both TMC and TCH annually since January 2008 tile June 2016 is shown in Figure 1. The maximum number of patients was in 2009, while the minimum number was in 2010. There were no cases registered in 2013, 2014 and 2015 due that the department of radiotherapy in TMC was not working for the development purpose; the Precise- linac was not working as it was under upgrading, while the Synergy-Linac was installed in 2013 and began working in 2016. In addition, the Co-60 unit of the TMC was out of order since 2012 because its radioactive source passed its half-life and had to be changed. Although, the cases that appeared in 2014 was only registered and diagnosed in TMC, but was not treated in TMC.

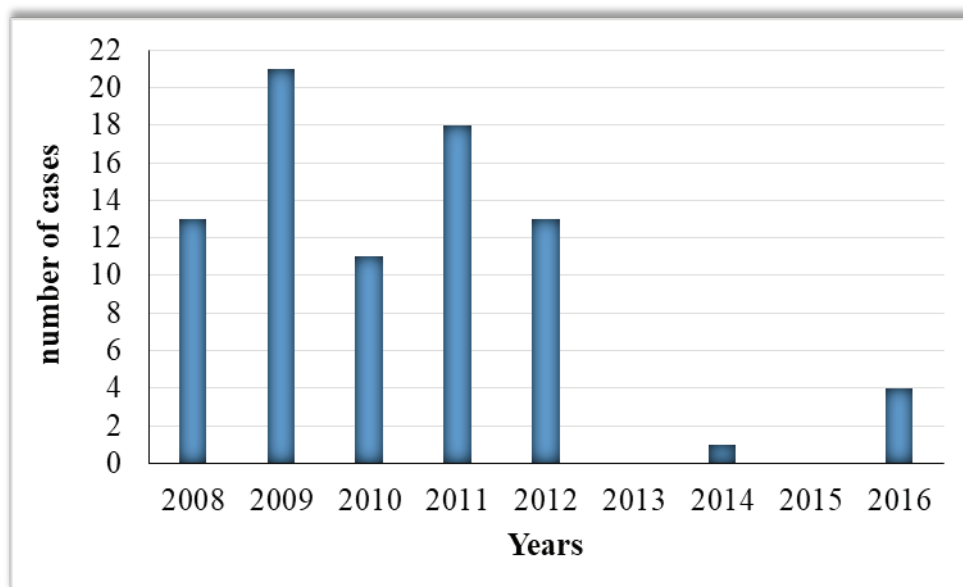


Figure 1: Demonstrates the number of laryngeal cancer cases registered annually in the department of radiotherapy at TMC and TCH.

T1 or T2 squamous cancer of the larynx and had radiation therapy failed. This study found that most patients with recurrence after radiotherapy required total laryngectomy (about 69.5%), while 31.5% of patient was performed conservation laryngeal surgery. This study also found that in 14 patients, local or regional recurrence developed after salvage surgery: 9 patients after total laryngectomy (12.3%; 9/73), and 5 patients (15.6%; 5/32) after conservation laryngeal surgery.

The results after radiation therapy for T1-T2 N0 glottic carcinoma vary considerably. Therefore, [14] analyzed patient-related and treatment-related parameters that may influence the likelihood of cure for five hundred nineteen patients, whom treated with radiation therapy and had follow-up for \geq two years. The outcome of this research was as following: Local control rates at five years after radiation therapy were T1A, 94%; T1B, 93%; T2A, 80%; and T2B, 72%. Rates of local control with laryngeal preservation at 5 years were T1A and T1B, 95%; T2A, 82%; and T2B, 76%. In addition, cause-specific survival rates at 5 years were T1A and T1B, 98%; T2A, 95%; and T2B, 90%. One patient with a T1N0 cancer and three patients with T2N0 lesions experienced severe late radiation complications. This study concluded that Radiation therapy cures a high percentage of patients with T1-T2N0 glottic carcinomas and has a low rate of severe complications

The results of induction chemotherapy followed by definitive radiation therapy were compared with conventional laryngectomy and radiation therapy post-surgery by [15] for patients with previously untreated advanced (stage III and IV) laryngeal squamous carcinoma. These preliminary results suggest a new role for chemotherapy in patients with advanced laryngeal cancer and indicate that a treatment strategy involving induction chemotherapy and definitive radiation therapy can be effective in preserving the larynx in a high percentage of patients, without compromising overall survival. The estimated two year survival was 68 % for both treatment groups. Patterns of recurrence differed significantly between the two groups, with more local recurrences and fewer distant metastases in the chemotherapy group than in the surgery group

3. Materials and methods

This research studied the age, sex, methods of diagnosis, and methods of treatment of patients of laryngeal cancer. The data was obtained from the patients' files in the department of radiotherapy, at Tripoli Medical Centre (TMC), Tripoli, Libya and in department of radiotherapy, at Tripoli Central Hospital (TCH), Tripoli, Libya. However, the study covered the period time since January 2008 tile June 2016.

4. Results and discussion

Eighty-one cases of laryngeal cancer were collected from the patients' files

As the EBRT presents the essential treatment for laryngeal cancer, therefore, this research focused on the radiotherapy [10]. 2D conformal radiotherapy technique using Cobalt-60 and Linac only is available in Libya, and even the majority of the world stop using Cobalt-60 machine, it still playing significant roles for treatment in Libya Therefore, both machines are explained in below:

1.3.1.1. Cobalt 60

It is the oldest radiotherapy equipment based on the treatment of deep seated tumors via gamma rays emit from the disintegration of ^{60}Co radioactive source. The ^{60}Co source decays to ^{60}Ni with the emission of β -particles ($E_{\text{max}} = 0.32$ MeV) and two photons per disintegration of energies 1.17 and 1.33 MeV. These γ - rays constitute the useful treatment beam. The β - particles are absorbed in the cobalt metal and the stainless steel capsules those surround the ^{60}Co source. [11]

The half-life of ^{60}Co is 5.272 years, therefore, the source should be changed when the dose produced becomes 50 % lower than its initial value, by other words when the activity of the source becomes (2/3) of its initials. That means the source have to be changed after 3.5 years. The ideal source strength is 200 TBq (5.4 kCi) at beginning of its use. [11]

^{60}Co has proved to be the most suitable for EBRT. The reasons for its choice over other radionuclides are higher possible specific activity (curies per gram), greater radiation output per curie, and higher average photon energy. [11]

1.3.1.2. Linear Accelerator (LINAC)

Linac is a device that uses high-frequency electromagnetic waves (in the microwaves region on ($\sim 3,000$ megacycles/sec) to accelerate charged particles such as electrons to high energies through a linear tube. The high energy electron beam itself can be used for treating superficial tumors, or it can be made to strike a target to produce x-rays (bremsstrahlung x-rays) for treating deep seated tumors. [11]

It is customary for some of the manufacturers to designate their linear accelerators that have both electron and x-ray treatment capabilities by the maximum energy of the electron beam available [11]. For example, the Elekta Synergy Linac, available in the Tripoli Medical Centre (TMC) produces electron beams of energies of 4, 6, 8, 10, 12 MeV and x-rays beams of energies of 6, 10, MV. Elekta Precise linac, also available in the TMC, produces electron beams of energies of 4, 6, 8, 10, 12, 15 and 18 MeV, and x-ray beams of energies of 6, 10, 15 and 18 MV.

2. Literature review

[13] Compared the efficacy of conservation versus total laryngectomy for salvage as recurrence treatment for 105 patients who initially presented with

known as adjuvant therapy. [10]

Chemotherapy: is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping the cells from dividing. In the systemic chemotherapy, the chemotherapy is taken by mouth or injected into a vein or muscle, and the drugs enter the bloodstream, so can reach cancer cells throughout the body. While, in the regional chemotherapy, chemotherapy is placed directly into the cerebrospinal fluid, an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas. [10]

Radiation therapy: or Radiotherapy is the technique that based on using ionizing radiation (photons or radioactive particles) to kill tumor, where radiotherapy aims to deliver highest homogenies dose to the tumor and lowest does to the surrounded healthy tissue. Radiotherapy procedures classified to two categories: [11]

1. External beam radiotherapy (EBRT): In EBRT the radiation source is at a certain distance from the patient and the target within the patient is irradiated with an external radiotherapy beam. Most EBRT is carried out with photon beams, some with electron beams and very small fraction with protons, heavier ions or neutrons. Regarding to EBRT by photon; there are two origins of photon beams: γ -rays, which originate from radioactive nuclei, and x-rays, which originate when a target bombarded with energetic electrons. Co-60 unit and Linear accelerator are examples of EBRT-photon megavoltage therapy machines. [11]

2. Internal beam radiotherapy (IBRT) or Brachytherapy: is a method of treatment in which sealed radioactive sources are used to deliver radiation at a short distance. In Brachytherapy, radiation sources are placed directly into the target (intracavitary or interstitial brachytherapy) or on to a target (surface mould or intraoperative brachytherapy). In the past, brachytherapy was carried out mostly with radium or radon sources. Currently, use of artificially produced radionuclides such as ^{137}Cs , ^{192}Ir , ^{198}Au , ^{125}I , and ^{103}Pd is rapidly increasing. [11]

Hypofractions: In radiotherapy techniques both normal or tumor cells are affected with radiation, but normal cells can repair the damage better than tumor cells [12]. The radiotherapy is killing or stop brain tumor growth, where radiotherapy works by damaging the DNA inside the cells, making them unable to divide and reproduce. The radiotherapy side effects commonly occur in the treatment area and are usually temporary, but some may be permanent or last for a few months or years. They may include: nausea, headaches, tiredness or fatigue, red, sore, inflamed or flaky skin, and hair loss. [12]

1.3.1. CLassic radiation therapy

because of the motion artefact that results due to the longer scanning time for MRI [8]. The contrast required to appear the blood vessels and thyroid gland. [2]

1.2. Staging

Staging determines if a tumor has spread beyond the site of its origin and if it spreads, how far. Staging for laryngeal cancer depends on the location and extent of the tumor, and whether it has invaded any lymph nodes or nearby structures. Staging is an important step in evaluating prognosis and treatment options. [2]. The American Joint Committee on Cancer (AJCC) established the staging system for laryngeal primary cancer in 1992 [9]; for instance supraglottis tumor stages are Tis (known as stage 0) , T1, T2, T3 and T4, while Glottis tumour stages are Tis, T1, T1a, T1b, T2, T3 and T4, the details included in the [2].

T describes the size of the tumor, N describes whether cancer has spread to the lymph nodes and M gives an indication of whether the cancer has spread to other parts of the body. The T stage is given as a number from 1 to 4, small tumors confined to one part of the larynx are described as T1 tumors and large tumors that have grown into tissues outside the larynx are described as T4. The N stage is given as a number from 0 to 3, N0 means the lymph nodes are not affected, whereas stages N2 to N3 mean that 1 or more lymph nodes are affected. The M stage is given as either M0 or M1 , M0 means the cancer has not spread to other parts of the body and M1 means that it has. [3]

1.3. Methods of treatment

Treatment selection depends on the stage of the disease, the location and size of the tumor, keeping the patient's ability to talk, eat, and breathe as normal as possible, and recurrence of the cancer. However, smoking tobacco and drinking alcohol decrease the effectiveness of treatment for laryngeal cancer. Different types of treatment are available for patients with laryngeal cancer. Some treatments are standard (the currently used treatment) includes, Radiation therapy, surgery and chemotherapy, and some are being tested in clinical trials, such as targeted therapy and radiosensitizers. [10]

Surgery: is a common treatment for all stages of laryngeal cancer. The surgical procedures include: cordectomy, supraglottic laryngectomy, hemilaryngectomy (Surgery to remove half of the larynx and the voice been saving), partial laryngectomy (Surgery to remove part of the larynx, a partial laryngectomy helps keep the patient's ability to talk), total laryngectomy, thyroidectomy, and laser surgery (a laser beam is used as a knife to make bloodless cuts in tissue or to remove a surface lesion as a tumor the larynx. However, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left. Treatment given post-surgery, to lower the risk of tumor recurrence

In the UK, there are more than 2,000 new cases of laryngeal cancer each year [3]. The laryngeal cancer is more common in men than women, and in people over the age of 60 [3]. In the USA, 10,900 new cases of cancer of larynx were registered; 8900 men and 2000 women, and about 4230 deaths from the cancer of larynx [4]. During the diagnosis stage; 62% of the laryngeal cancer cases were diagnosed of that the cancer remain localized, 26% having locally spread, and 8 % having distant metastases [5]. However, the ration of glottic to supraglottic carcinoma is approximately 3:1[2]

Cancer of larynx is strongly related with cigarette smoking. The risk of having cancers of the upper alimentary and respiratory tracts decreases for ex-smokers after 5 years, and may reach the risk of nonsmokers after the 10 year of quit smoking [6]. Yet, the method of alcohol to stimulate the laryngeal cancer uncertain [7]. There is some evidence telling that, the heavy marijuana smoking relates with the laryngeal cancer for young patients. [2]

The main symptoms of laryngeal cancer include: a change in the voice, hoarseness, pain during the swallowing or difficulty swallowing, a lump or swelling in the neck, a long-lasting cough, sore throat, ear pain, pain at the thyroid cartilage, airway obstruction, difficulty breathing (in severe cases). Some people may also experience bad breath, breathlessness, a high-pitched wheezing noise when breathing, unexplained weight loss, fatigue (extreme tiredness). Late symptoms include weight loss, foul breath, dysphagia, and aspiration. [2]

The treatment for laryngeal cancer largely depends on the size of the cancer and its stage. The main treatments are radiotherapy, surgery and chemotherapy. The cancer of larynx has high probability of recurrence, most recurrence appear within 18 months, but late recurrences may appear after 5 years. The local recurrence increases the risk of metastatic disease in lymph nodes. [2]

In below the details of the methods of diagnosis and treatment of laryngeal cancer.

1.1. Diagnostic workup

Diagnostic workup for carcinoma of larynx is in the following sequence: history, physical examination using nasendoscopy, laryngeal mirror and indirect or direct laryngoscopy, biopsies (during nasendoscopy and laryngoscopy), further tests if the biopsy confirms existing of the laryngeal cancer such as, chest x-ray, CT with contrast, MRI (for selected cases), PET- CT scan, ultrasound. [2]

The CT should be performed before biopsy to avoid the confusing of the tumour by the abnormality resulting from the biopsy. CT is preferred to MRI

Laryngeal Cancer in Libya

▪ Dr. Fatma Issa* ▪ Ayoub Lehió** ▪ Tahani Aldarhubi***

Abstract

Cancer of the larynx affects more than 12,000 people each year and results in an estimated 3700 deaths [1]. It also has high probability of recurrence to within three years.

This research aims to study the Laryngeal cancer in Libya, including methods of diagnosis and treatment for Laryngeal cancer followed in Libya. This study basing on the statistical data. The entirely data was obtained from the department of radiotherapy in Tripoli Medical Centre and Tripoli Central Hospital, Tripoli, Libya.

The results illustrated that the cancer of larynx effects males more than females, the , the biopsy and CT were most diagnosed method used for laryngeal patients, and the treatment method was 2D conformal radiotherapy using Co-60 unit, which is available in both hospitals.

Keywords: Laryngeal cancer, larynx, Radiotherapy, conformal, EBRT, ⁶⁰Co, Linac, diagnosis, recurrence, staging, symptoms

1. Introduction

The larynx is divided into supraglottic, glottis and subglottic region. The subglottic larynx consists of the epiglottis, the false vocal cords, the ventricles, and the aryepiglottic folds, including the arytenoids. The glottis includes the true vocal cords and the anterior commissure. The subglottis is located below the vocal cords. [2]

Laryngeal cancer is a disease in which malignant (cancer) cells form in the tissues of the larynx. Cancer of the larynx is most common head and neck cancer (excluding skin cancer), and represents about 2 % of the total cancer risk [2].

*Staff member, department of diagnostic and therapeutic radiology, Faculty of Medical Science and Technology, Tripoli, Libya /& Medical Physics specialist, department of medical and radiation physics, Tripoli Medical Centre (TMC), Tripoli, Libya.

** Department of diagnostic and therapeutic radiology, Faculty of Medical Science and Technology, Tripoli, Libya.

*** Department of diagnostic and therapeutic radiology, Faculty of Medical Science and Technology, Tripoli, Libya.