



Overview and Trends of Comprehensive Management of Esophageal Cancer in My Country in the Era of Precision Medicine

Guoren L* and Jianhua D

Department of Thoracic Surgery, Lianyungang Hospital Affiliated to Xuzhou Medical University, Lianyungang First People's Hospital, China

Abstract

In the 21st century, clinical medicine has entered the era of precision medicine. Under the guidance of the concept and technology of "Precision Medicine", the Multidisciplinary Diagnostic and Therapeutic Team (MDT) is dominant by the surgery department of esophageal cancer has implemented the standardized, minimally invasive, precision of radical operation for esophageal cancer and individualized multidisciplinary comprehensive treatment, the resection rate and survival rate were improved. However, in view of the low rate of early diagnosis of esophageal cancer, the diagnosis and treatment are mostly in the middle and late stages, especially the lack of follow-up and management after treatment, which greatly affects the long-term survival rate and quality of life of patients. Therefore, it is the development trend of esophageal cancer surgery to construct a new model and management system of integrated and precision whole-course health management. This article reviews the current status of precision diagnosis and treatment of esophageal cancer surgical and the development trend of whole course health management.

Keywords: Esophageal cancer; Precision diagnosis and treatment; Whole course management

Introduction

Esophageal cancer is a common upper gastrointestinal malignancy worldwide, and China is a country with a high incidence of esophageal cancer. According to statistics from the World Health Organization, in 2020, there were 604,000 new cases of esophageal cancer and 544,000 deaths worldwide, accounting for 3.3% and 5.5% of the total number of new cases and deaths, respectively, ranking 8th and 6th [1]. In China, there were 324,000 new cases and 301,000 deaths, respectively, ranking 6th and 4th among all malignant tumors; accounting for 53.70% and 55.35% of the world's total, respectively, ranking first in the world [2]. It is a major malignant tumor that seriously threatens the lives and health of Chinese residents and has a heavy disease burden.

In the 1960s and continuing until the late 1980s, China conducted large-scale surveys and prevention and treatment in high-incidence areas of esophageal cancer, carried out primary and secondary prevention, nutritional intervention and blocking treatment, and made historic contributions to reducing morbidity and mortality. In the 21st century, the "Cancer Prevention and Control Implementation Plan (2019-2022)" and the "Healthy China Action Plan (2019-2030)" were formulated and implemented as national strategies; in 2006, some provinces and regions with high incidence of esophageal cancer in China successively carried out key screening of high-risk populations, and by 2014, it had been expanded to 142 cities and counties in 29 provinces and regions [3]; other regions carried out targeted special examinations and opportunistic screening for target populations with high-risk factors during clinical work in medical institutions at all levels and physical examinations of healthy people, which played a positive role in the early detection and scientific prevention and treatment of esophageal cancer.

With the development of China's social economy and the implementation of esophageal cancer prevention and control work, people's living standards, nutritional status, lifestyle and eating habits have continued to improve and enhance. Since 2000, the incidence and mortality rates of esophageal cancer have generally shown a downward trend, with an average annual decrease of 2.9% and 4.6% for men and women respectively [4]. However, given China's huge population base and aging trend, the National Cancer Registry shows that in 2015, there were 246,000 new cases of esophageal cancer and 188,000 deaths [5]; in 2016, there were 252,500 new cases and 193,900 deaths [2]; in 2018,

OPEN ACCESS

*Correspondence:

Guoren Li, Department of Thoracic Surgery, The First People's Hospital of Lianyungang, Affiliated Lianyungang Hospital of Xuzhou Medical University, Lianyungang 222000, China,

Received Date: 15 Jul 2024

Accepted Date: 31 Jul 2024

Published Date: 05 Aug 2024

Citation:

Guoren L, Jianhua D. Overview and Trends of Comprehensive Management of Esophageal Cancer in My Country in the Era of Precision Medicine. *World J Surg Surgical Res.* 2024; 7: 1564.

Copyright © 2024 Guoren L. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

there were 258,000 new cases and 193,000 deaths [4]; in 2022, there were 224,000 new cases and 187,500 deaths [6]. The morbidity and mortality rates are still high, the prevention and control situation is severe, and there is still a long way to go.

In the 21st century, clinical medicine has entered the era of precision medicine. With the development of society, economy and modern high-tech, the progress of basic and clinical research related to esophageal cancer, the deepening of understanding of tumor biological characteristics and the improvement of tumor surgical concepts, the treatment concept of esophageal cancer in China and the treatment model under its guidance are gradually evolving, developing and standardizing. From a single-discipline treatment model of radical surgical resection of esophageal cancer, it has gradually evolved into an individualized multidisciplinary comprehensive treatment model with radical surgery as the main focus [7]. With the deepening of the concept of precision, the development of early screening, the standardization of surgical methods and the popularization of minimally invasive diagnosis and treatment technologies, as well as the progress of individualized comprehensive treatment and the implementation of accelerated recovery surgical technology, the 5-year overall survival rate after surgery has increased to 52.9% [5].

Given China's large population base and high incidence of esophageal cancer, the main pathological type is highly heterogeneous squamous cell carcinoma, accounting for 95.5%, mostly located in the middle chest, accounting for 63.6% (upper segment accounting for 10.8%, lower segment accounting for 25.5%) [5]. The early diagnosis rate is low, only about 1.5%, and most of the patients are in the middle and late stages when clinically diagnosed, accounting for about 90% [8]. It has a high recurrence and metastasis rate, and the overall recurrence rate after surgery is 30% to 50%. It is a malignant tumor with Chinese characteristics and should be given special attention. "Early detection, early diagnosis, early intervention, and precise diagnosis and treatment" of esophageal cancer are the key to improving the survival rate; the 5-year survival rate of early esophageal cancer treatment can reach more than 95%; the survival rate of middle and late stage esophageal cancer after surgery has been hovering around 30%, of which 80% of patients die in the recovery period due to recurrence and metastasis, resulting in low long-term survival rate and related quality of life of patients. The main reason is that the diagnosis and treatment of esophageal cancer has traditionally been limited to individual management within the hospital. After the patient is discharged from the hospital, it usually means the end of treatment. The follow-up rate is extremely low, and even the follow-up is short-term or for scientific research needs; for patients in the community and at home, tracking, monitoring and management are not given enough attention, and there is no high-quality full-process medical and health management and quality standard control system, resulting in delayed diagnosis and treatment and intervention, and absence of health management; at the same time, due to postoperative complications and adverse reactions to treatment, as well as patients' psychological disorders, physiological functions and physical decline, the long-term survival rate and quality of life of patients throughout their life cycle are low. To this end, the Outline of the Healthy China 2030 Plan proposes to transform the traditional "disease-centered" to the modern "patient-centered" and the new concept of full-process management from "disease management to health management". Full-process management should include preventive care and disease screening for preclinical patients with risk factors before

hospitalization; precise diagnosis and treatment and rehabilitation in the hospital; follow-up monitoring, medical services, humanistic care and health management after discharge. It is the most basic principle and positive measure to improve the long-term survival rate and quality of life of patients, reduce mortality, and ultimately achieve the goal of improving the prognosis of esophageal cancer. This article reviews the overview and trend of "full-process management" of esophageal cancer in China.

Concept of Comprehensive Management of Esophageal Cancer

The 21st century, the World Health Organization proposed a new concept of modern health: The traditional "disease-centered" concept should be transformed into a "patient-centered", "health-centered" and "human development-centered" concept. The implementation of patient-centered whole-process health management, as a new concept and strategy, will revolutionize the development of esophageal cancer surgery. Whole-process health management is "patient-centered", focusing on the whole process of disease occurrence and development, and establishing a health management system according to different stages. It is a transformation from traditional "disease management" to a modern "health management" comprehensive diagnosis and treatment model.

The whole-process management of esophageal cancer is a new model of joint management with individualized, closed-loop, and whole-process guidance, with a Multidisciplinary professional Team (MDT) led by the esophageal cancer surgery department, participating in and dynamically evaluating the whole-process management of patients from the three stages of "pre-hospital screening and early diagnosis, in-hospital precise diagnosis and treatment and rapid rehabilitation, to post-hospital long-term follow-up monitoring, subsequent recuperation and health maintenance, and finally hospice care". Whole-process management provides comprehensive and continuous medical services, health care guidance and humanistic care to restore, maintain and promote the long-term survival and healthy life of patients, so as to prolong the survival of patients, improve the living index and the overall efficacy of esophageal cancer, and has made great progress [9]. At present, it is also the strategy proposed in the "Healthy China Action-Cancer Prevention and Control Action Implementation Plan (2023-2030)" to achieve chronic disease health management for the whole population and the whole life cycle, and to increase the overall 5-year cancer survival rate by 15% to 46.6%.

In recent years, the "National Primary Health Comprehensive Pilot Zone Construction" proposed "single disease group management", which takes the sick individual and the group of the same disease as the basic management unit, based on the whole chain of health management, accurate to the person and the group, to achieve a unified and orderly full-process management method for individuals and groups, integrate clinical medicine into the health management system, and provide sick individuals with a homogeneous, full-process, integrated system and continuous service model. Therefore, the inclusion of esophageal cancer patients in the single disease group management system is a new model and development trend of health management.

Screening and Early Diagnosis of Esophageal Cancer

Screening for esophageal cancer is still the main effective means of early detection and early diagnosis, the premise and key to precise

treatment, and the most basic principle and positive measure to improve the cure rate and survival rate. In the 1960s, China conducted a large-scale social group census; from 2006-2014, it conducted site-selected screening of high-risk groups, which played a positive role in the early detection of esophageal cancer. Based on China's huge population base and the principle of health economics that takes into account both social benefits and cost-effectiveness evaluation, large-scale social group censuses are no longer in line with China's national conditions [8]. A sound screening mechanism, reasonable selection of screening target populations, and the development of scientific screening methods are the key to improving the early detection and diagnosis of esophageal cancer. Therefore, screening of high-risk populations in the preclinical stage with risk factors is the initial stage of the overall management of esophageal cancer. At present, the focus screening of high-risk groups and the combination of targeted special examinations and individual clinical opportunistic screening for target populations with high-risk factors through risk factor prediction and assessment and stratification during physical examinations and clinical routine medical care at all levels of medical institutions are the standardized path and more feasible screening strategy for detecting early esophageal cancer at this stage, and are also an important path for the prevention and control of esophageal cancer in the future [8,10]. In recent years, based on the invasiveness of the screening technology itself and the subsequent risks, it has been proposed to establish a precise screening model of "esophageal malignant lesion risk prediction model" and "esophageal precancerous lesion progression risk prediction model" that conforms to the characteristics of the Chinese population. Through individualized risk prediction and stratification, the high-risk population can be enriched, and the prediction accuracy can be as high as 87.1% (population in high-incidence areas) and 84.3% (population in non-high-incidence areas), reducing the initial screening workload, improving the detection rate and diagnostic accuracy, and avoiding excessive microscopic examination and its adverse events [11].

In recent years, the application of AI-assisted endoscopy, imaging and pathology in the diagnosis of esophageal cancer has provided a more efficient and accurate method for improving the detection rate and diagnosis rate of early lesions. The Guidelines [2] do not recommend biomarker testing for esophageal cancer screening; instead, they recommend the use of a new esophageal cell collector for non-invasive initial screening before endoscopy, combined with an AI-assisted cell diagnosis system, which has a sensitivity of 90%, a specificity of 93.7%, an accuracy of up to 94.1%, and an extremely low incidence of adverse events, in order to achieve the prospect of accurate early screening and application. However, tumor markers can be used for follow-up examinations and monitoring to predict recurrence [12]; therefore, it is possible to consider combining biomarker testing with liquid biopsy technology as an early warning screening for precancerous lesions and early cancers to improve the accuracy, participation rate and screening efficiency of high-risk populations and reduce screening adverse events [10].

Endoscopic examination supplemented by esophageal mucosal staining, indicative biopsy, and pathological examination has become the most practical and effective esophageal cancer screening method and the gold standard for early diagnosis in China. It is the best and most practical method to improve the detection and diagnosis rate of early esophageal cancer and precancerous lesions [10]. The Guidelines recommend Lugol's solution staining endoscopy or narrow-band imaging endoscopy as the first choice for screening;

the sensitivity, specificity, and accuracy of combined application for diagnosing early cancer are 95.89%, 99.3%, and 99.8%, respectively [2]. With the iteration of equipment and the advancement of technology, new endoscopes such as electronic staining endoscopes, Magnifying Endoscopes (ME), Confocal Laser Microendoscopy (CLE), and artificial intelligence microendoscopy have been applied to clinical examinations or "precise examinations". Among them, confocal laser microendoscopy visualization biopsy can achieve timely histological diagnosis, with a diagnostic sensitivity of 92.8% and a specificity of 100% for superficial squamous cell carcinoma, which has a higher diagnostic value for improving the detection rate of early cancer [10]. However, each of the above-mentioned examination techniques has its own unique value and function. Screening is usually based on ordinary white light endoscopy as the preferred method for opportunistic screening. According to different populations and lesions, available equipment conditions, technical levels and experience habits, appropriate methods are selected. Reasonable combined use can improve the accuracy, specificity and detection rate of lesion assessment. Patients who are intolerant to ordinary white light endoscopy can choose painless endoscopy or ultra-fine transnasal endoscopy [10].

Management of high-risk target populations for esophageal cancer screening: The target populations listed in the esophageal cancer screening program are mostly high-risk populations, and the screening interval is usually about 3 years. Some scholars recommend that the target populations be screened for esophageal cancer risk stratification, and that endoscopic screening be conducted every 5 years for the target populations in extremely high-incidence areas of esophageal cancer and high-risk populations in other areas; endoscopic screening should be conducted once every 10 years for some high-incidence areas with underdeveloped economies and scarce medical resources [10]. Based on the fact that esophageal cancer has a precancerous state, precancerous lesions, and early cancer stages for up to 5 to 10 years before it progresses to the middle and late stages, it provides an important window period for screening and prevention [13]. The Guidelines recommend that endoscopic review be conducted every 5 years for high-incidence areas and high-risk populations [2]. A study [14] showed that during the 13.5-year follow-up, the probability of normal squamous epithelium, mild, moderate and severe dysplasia progressing to squamous cell carcinoma was 8%, 24%, 50% and 74%, respectively, with the risk of disease increasing in sequence; follow-up found that dysplasia had a tendency to develop in both directions, among which 58.2% of mild hyperplasia achieved pathological reversal, while the possibility of reversal of severe hyperplasia was very small, and the cancellation rate was 65% to 75%. Therefore, the consensus [8] recommends that targeted regular follow-up examinations be selected based on the initial screening results to improve the detection rate and accuracy of early cancer. For patients with negative initial screening or basal cell hyperplasia, follow-up examinations should be conducted every 5 years. For patients with positive initial screening but unconfirmed pathological changes, a short-term individualized "fine examination" should be conducted. For patients with mild to moderate dysplasia (low-grade intraepithelial neoplasia), follow-up examinations should be conducted every 3 years. For patients with lesions with a diameter of >1 cm or with high-risk factors, follow-up examinations should be conducted annually for 5 years. For patients with severe dysplasia (high-grade intraepithelial neoplasia)/carcinoma in situ and above, follow-up examinations should be conducted in the short term to select appropriate individualized treatment plans. For patients who

refuse follow-up examinations, follow-up examinations should be conducted after 1 year. Some suggest that patients with mild hyperplasia can be followed up once every 5 years, and patients with moderate hyperplasia should be followed up once every 3 years [10]. Based on the limitations of the traditional follow-up monitoring program based on pathological diagnosis, it is proposed to use the "esophageal precancerous lesion progression risk prediction model" to evaluate and stratify the risk of precancerous lesions after initial screening, so as to increase the accuracy of precancerous lesion progression risk prediction from the current 70% based on pathological diagnosis alone to 90%, so as to achieve individualized follow-up and endoscopic monitoring [11].

Precision Diagnosis, Treatment and Rehabilitation of Esophageal Cancer

With the rapid development of social economy and science and technology, the understanding of tumor molecular biology has deepened, and the treatment concepts and models under their guidance have gradually evolved, updated, standardized, and developed for the precision diagnosis and treatment of esophageal cancer [7]. At present, there are diverse treatment methods and models for esophageal cancer. It is recommended that a Multidisciplinary joint Diagnosis and Treatment team (MDT) led by esophageal cancer surgery should be guided by the concept and technology of precision medicine and jointly participate in the discussion and formulation of radical surgery and individualized multidisciplinary comprehensive treatment plans with surgery as the main method. This is still the only effective method and mainstream model that can cure resectable esophageal cancer and benefit patients in the middle and late stages. It is also the core and key stage of the whole management cycle. In order to improve the RO rate and survival rate, reduce recurrence and metastasis, improve prognosis and maximize patient benefits, the combination of fine molecular typing under the genetic background and targeted immunotherapy for the beneficiary population with precise detection brings new hope and is the development direction of individualized precision treatment of esophageal cancer.

Given the individual differences of esophageal cancer patients and the high heterogeneity of tumor tissues and tumor cells, accurate clinical and pathological staging is the basis for the targeted development of the best individualized precision treatment plan. Therefore, strictly following the staging comprehensive treatment model of the "AJCC TNM Staging System (8th Edition)" [15], "CSCO Esophageal Cancer Diagnosis and Treatment Guidelines 2022" and "Chinese Perioperative Diagnosis and Treatment Practice Guidelines for Resectable Esophageal Cancer (2023 Edition)" [16] is the basis and principle for the implementation of standardized precision treatment; through MDT joint participation in research, according to different stages, combined with tumor location, infiltration depth and range, lymph node metastasis characteristics and the specific conditions of the patient, the best first comprehensive treatment plan is tailored or selected to achieve precision policy implementation. At present, radical surgery and individualized multidisciplinary comprehensive treatment with surgery as the main approach are the main treatment modes for esophageal cancer. However, radical surgery for esophageal cancer is the most traumatic, challenging and high-risk surgical procedure in the field of surgery. In order to make the surgery accurate, robust, thorough and safe, a comprehensive, adequate and integrated assessment of the patient should be conducted before surgery based on the severity of the lesion and

the possibility of anatomical radical resection, the surgical method and risk, the body condition and surgical tolerance, the patient's and family's acceptance attitude and willingness, and the expected effect. The formulation of a precise treatment strategy is the basic strategy to ensure the maximization of the treatment benefits of esophageal cancer patients and to improve the overall efficacy of esophageal cancer in China [17]. Risk stratification is performed based on the assessment results. Patients who are basically healthy or at low risk can directly receive surgical treatment; preventive measures are required for those at moderate risk, including further examination, intervention and treatment of underlying diseases, correction and control of abnormalities, improvement of nutrition and physical condition and organ function support, and postponement of surgery until risk is reduced; strict anesthesia and surgical plan design and implementation, and strengthening of perioperative monitoring and management; for high-risk patients, surgery should be avoided as much as possible or non-surgical treatment should be selected; treatment options should be individualized, moderately reasonable and more accurate [17].

Esophageal cancer is usually divided into resectable, marginally resectable and unresectable esophageal cancer according to the possibility of radical resection of the anatomical lesion:

Resectable esophageal cancer

Including stage I (cT1N0M0), stage II (cT2N0-1M0, cT3N0M0), stage III (cT3N1M0, cT1-3N2M0) and some cT4a thoracic esophageal cancers in stage IVA, which are usually resectable esophageal cancers; among them:

Stage I patients, endoscopic treatment (ER, *i.e.*, EMR\ESD) or laparoscopically assisted minimally invasive surgery is chosen based on the depth of tumor infiltration (mucosal layer M, stage T1a, submucosal layer SM, stage T1b) and the probability of lymph node metastasis (the metastasis rate of M1 and M2 is only 0% to 5%, that of M3 and SM1 is 10% to 20%, and that of SM2 and SM3 is as high as 19% to 56%) [17]. Endoscopic minimally invasive surgery has become the preferred treatment for patients with early esophageal cancer who want to preserve the esophagus. For patients with cT1a (including Tis), only TisM1 and T1aM2 are absolute indications for endoscopic treatment. For T1aM3 and T1bSM1, the absence of evidence of lymph node metastasis in preoperative evaluation is a relative indication, and surgical treatment is recommended [18]. Based on surgical morbidity, mortality, and postoperative quality of life, comprehensive treatment with endoscopic resection as the main approach can be selected for T1bSM1-2 [18]. For patients with esophageal squamous cell carcinoma lesions that are longer than 5 cm or involve more than 3/4 of the circumference, the overall incidence of stenosis after ESD is approximately 11.6%, which can reach 83.3% [12]. Some reports have shown that the incidence is as high as 70.1% to 100% [2]. Surgical (MIE) resection is recommended. For patients with cT1b (SM2-3, including T1aM3) and cT1a stage PT1b after ESD (lymph node metastasis risk 5.2%-16.6%), patients without high risk of recurrence need adjuvant chemoradiotherapy. Endoscopic treatment is not recommended for patients with high risk of recurrence [19], but radical surgery is recommended [18]. For patients who are intolerant or unwilling to undergo surgery, and (SM1-2), a comprehensive treatment of "endoscopic + selective chemoradiotherapy" with esophageal preservation is a feasible strategy [19]. For patients with complete R0 resection in stage I, close follow-up is required after surgery, and adjuvant therapy is

generally not required. However, for patients with high-risk factors such as positive margins, poor differentiation, vascular invasion, wide range (length ≥ 2 cm), and infiltration involving the submucosal layer ≥ 200 μ m, additional treatment should be considered. Some scholars recommend supplementary radiotherapy, chemotherapy or chemoradiotherapy, or supplementary minimally invasive radical surgery, or direct minimally invasive radical surgery [20]. For cervical and upper thoracic cT1b to cT2N0 esophageal cancer with the upper edge of the tumor ≤ 5 cm from the cricopharyngeal muscle, the 10-year overall survival rates of surgery alone and chemoradiotherapy were 20.7% and 11.4%, respectively [18]. Given the trauma of surgical resection and loss of esophageal function, radical chemoradiotherapy is recommended as the first choice [21].

Stage II patients, including T1b, radical surgery (OE or MIE) is the preferred treatment. Patients in cT2N0 and R0 stages do not require adjuvant therapy after surgery. However, for R0 patients with high-risk factors (N1-3 stages), adjuvant radiotherapy after surgery can improve the 5-year survival rate. For cT2N1M0 and cT3N0M0 stages, neoadjuvant combined with surgical treatment is recommended. Radical chemoradiotherapy can be performed for patients who are not scheduled for surgery, cannot tolerate or do not agree to surgery [1].

Some patients with stage III and stage IVA cT4aN0 to 1M0 are considered to have resectable locally advanced/advanced esophageal cancer (referring to patients whose primary tumors invade the local anatomical structure of the esophagus or regional lymph nodes but have not metastasized to distant sites). Neoadjuvant combined with surgical treatment has become the preferred standard comprehensive treatment model [16]. For patients who are intolerant or unwilling to undergo surgery, radical chemoradiotherapy can be used [1]. In preoperative neoadjuvant therapy, the PCR rates of nCRT and nCT were 27.7% and 2.9%, respectively, but there was no statistically significant difference in long-term prognosis [16]. After the completion of neoadjuvant therapy, it is evaluated whether surgical treatment is possible. For patients with clinically evaluated cCR, surgery is still recommended first. For patients who do not obtain PCR, postoperative adjuvant immunotherapy is recommended. For patients who are intolerant or refuse surgery, radical chemoradiotherapy is a commonly used treatment option [21]. Given that the overall recurrence rate of patients receiving neoadjuvant chemoradiotherapy is 30% to 50%, with distant metastasis being the main cause [22]; some reports have reported a recurrence rate of 33.7% (local recurrence accounts for 9.8%, distant recurrence accounts for 19.6%, and simultaneous recurrence accounts for 4.3%) [23]; therefore, for patients who have not reached PCR after surgery, immunotherapy can effectively reduce the risk of recurrence by 31% [22]. Recently, preoperative immunotherapy combined with neoadjuvant chemotherapy or concurrent chemoradiotherapy is recommended for locally advanced esophageal cancer, which helps to downstage the tumor and improve the R0 resection rate and PCR rate; the pCR rates of immunotherapy combined with nCRT and immunotherapy combined with nCT were 39.8% and 33.8%, the MPR rates were 88.8% and 53.5%, and the rates of grade 3-4 severe adverse reactions were 48.3% and 23.3% [16]. It has been reported [20] that the average PCR rate of immunotherapy alone or combined with nCT was 25.8%; immunotherapy combined with nCRT can be as high as 50% or more. Professor Tian Ziqiang reported that the survival rate of nCT combined with immunotherapy reached more than 80%, and the 5-year overall survival rate exceeded 65%; therefore, for patients

who are intolerant and at risk of adverse reactions, nCT combined with immunotherapy should be considered. Recently, from the perspective of thoracic surgery, it was proposed [19] that based on the fact that preserving the esophagus can improve the quality of life, for patients with locally advanced resectable thoracic squamous cell carcinoma, the neoadjuvant synchronous Chemoradiotherapy Sequential Immune induction therapy model (CRIS) is used. When patients who achieve cCR choose to preserve the esophagus, a close follow-up active monitoring strategy can be adopted. It is feasible to perform salvage surgery in time for local recurrence, and ultimately $\geq 35\%$ of patients can avoid esophagectomy.

Marginally resectable esophageal cancer

Refers to locally advanced esophageal cancer in which the primary tumor is suspected of involving surrounding organs after clinical evaluation, but cannot be confirmed to be cT4b [16]. Neoadjuvant chemoradiotherapy is recommended, and secondary evaluation after treatment is performed. For those who can be radically resected, surgical treatment is performed; for those who cannot be resected, radical chemoradiotherapy is continued [1]. The "Guidelines" [16] recommend that for cT3-4aN0M0/cT1-4aN1-3M0, cervical and upper thoracic esophageal cancer ≤ 5 cm from the cricopharyngeal muscle can be considered as potential surgical indications under the premise of multidisciplinary treatment. Compared with chemoradiotherapy, the 10-year overall survival rates are 20.4% and 9.0%, respectively. Radical surgery can obtain a longer disease-free survival period, but it is not widely accepted; it is recommended to give priority to radical chemoradiotherapy + chemotherapy [21].

Unresectable esophageal cancer

It refers to patients with cT4b or N3 in any stage IVA with primary tumors involving surrounding organs such as the heart, aorta, vertebrae or trachea, and with distant metastases (including non-regional lymph nodes), who are unresectable locally advanced esophageal cancer patients. Concurrent CRT is recommended as the standard treatment mode, or chemotherapy alone [1]. Combined immunotherapy is the best mode and can improve the efficacy [24]. Radiotherapy is a treatment option for patients with locally advanced or unresectable esophageal cancer. Three-dimensional conformal radiotherapy, Intensity-Modulated Radiotherapy (IMRT) and Proton Beam Therapy (PBT) are recommended, which can minimize the dose to normal tissues and translate into improved clinical outcomes [23].

Stage IVB patients, also classified as unresectable esophageal cancer, refer to advanced esophageal cancer with distant organ metastasis (TanyNanyM1). They may be in the advanced stage at diagnosis, or they may be patients with esophageal cancer whose tumors relapse and progress to the advanced stage after surgery, radiotherapy, or chemotherapy. Appropriate systemic comprehensive treatment and palliative supportive treatment are the main treatments. Chemotherapy is recommended for patients with good general condition; chemotherapy combined with immunotherapy is the standard treatment, and local radiotherapy can be combined if necessary; but about 40% of patients cannot tolerate it, and targeted and/or immunotherapy can be combined, with palliative and supportive treatment as the main means [1]. Currently, combined immunotherapy has become the first- and second-line standard treatment for patients with locally advanced, recurrent or metastatic ESCC, providing survival benefits for patients and opening a new chapter in immunotherapy for esophageal cancer

[7]. For postoperative recurrence and symptomatic metastatic lesions or obstruction, targeted palliative radiotherapy can be considered to relieve symptoms [24]. Palliative supportive treatment, such as esophageal dilation or stenting, symptomatic treatment, such as analgesia, and optimal nutritional support therapy, can relieve dysphagia, reduce symptoms, improve local control, prolong survival and improve quality of life [1]. Given that traditional Chinese medicine has the most advantages and unique efficacy in treating esophageal cancer, treatment should be based on differentiation of symptoms according to the different stages of esophageal cancer development, or combined with traditional Chinese and Western medicine to alleviate the negative reactions and complications of chemotherapy/radiotherapy, improve efficacy and quality of life, and prolong survival [25].

Radical surgery for esophageal cancer is the premise and key to comprehensive treatment of esophageal cancer. It is the preferred method and mainstream surgical procedure for resectable esophageal cancer. In order to achieve the standard of "radicality", with the development of high-tech, the iteration and update of equipment and the in-depth understanding of tumor biological characteristics, surgical methods and techniques have been continuously upgraded and improved. The surgical method, approach, lymph node dissection and other aspects have been comprehensively developed and gradually matured and standardized. It is mainly based on the location of the lesion, tumor size, degree of invasion, clinical stage, lymph node metastasis characteristics, as well as the patient's body condition, equipment conditions and the surgeon's experience and habits. Since the 21st century, with the improvement and gradual maturity of minimally invasive technology, it has developed from traditional Open Surgery (OE) based on basic anatomy to Minimally Invasive Surgery (MIE) with laparoscopic (thoracoscopic/laparoscopic/mediastinoscopy) magnified anatomy and Robot-Assisted Esophagectomy (RAMIE) with microscopic anatomy. All of them are optional surgical methods [7]. At present, laparoscopic minimally invasive esophagectomy has been widely performed, with the utilization rate rising from 38% in 2010 to 57% in 2015 [Shah MA 23]; Guo Xufeng et al. [26] reported that the utilization rate has reached more than 85%; Tian Ziqiang reported that the utilization rate has reached more than 95%. It has the advantages of reducing trauma, clear exposure, fine operation, precise anatomy, fast postoperative recovery, and safety and feasibility, and has become a routine mainstream surgical method in China. In recent years, Robot-Assisted Esophagectomy (RAMIE) is a new AI intelligent surgical system that can complete more complex operations, improve surgical accuracy and precision, and make radical surgery safe and feasible. It has been carried out in some hospitals and has broad development prospects, representing the future development direction.

The approach to radical surgery for esophageal cancer should be comprehensively considered and individually selected. For thoracic esophageal cancer, the right thoracic approach is recommended as the first choice for esophageal squamous cell carcinoma surgery. It is the most likely surgical method to achieve radical resection and thorough lymph node dissection. For middle and lower segment cancer without lymph node metastasis in the upper mediastinum, the left thoracic approach can be selected [1]. Li Zhigang et al. [27] reported that the right thoracic approach accounted for 88.7% (McKeown accounted for 64.2%, Ivor - Lewis accounted for 24.5%), and the left thoracic approach accounted for 11.3%; the right thoracic approach has become the main approach for esophageal cancer

surgery. In recent years, it has been proposed [28] that for cT1b-T3N0M0 patients who can be RO-resectable, due to chest atresia and poor lung function, transthoracic surgery is not suitable. Inflatable mediastinoscopy combined with laparoscopic minimally invasive resection of esophageal cancer can be selected.

Lymph node dissection is an important step in the radical cure of esophageal cancer. The lymph node metastasis rate of esophageal squamous cell carcinoma is greater than 60%. The area, range and number of lymph nodes dissected are the main factors affecting prognosis [22]. The basic principle of dissection is to select the area and number of lymph nodes to be dissected based on the accurate assessment of tumor location, stage and lymph node metastasis characteristics, so as to achieve individualization and precision. The "Guidelines" [1] recommend that for patients with middle and lower thoracic esophageal cancer, if there are no suspicious lymph nodes in the neck and supraclavicular regions, complete two-field lymph node dissection (including the bilateral tracheoesophageal groove and recurrent laryngeal nerve chain lymph nodes in the upper mediastinum and the lymph nodes in the thoracic and abdominal regions) is recommended; if there are suspicious metastatic lymph nodes or cancer in the upper thoracic region is assessed, three-field lymph node dissection is recommended. For initial esophageal cancer treated with direct surgery, at least 15 lymph nodes should be cleared, and for locally advanced esophageal cancer after neoadjuvant therapy, more than 20 lymph nodes should be cleared; systematic lymph node dissection is still recommended for PCR patients, which helps reduce the risk of local recurrence and prolong recurrence-free survival and overall survival [16]. Targeted three-field dissection is a more reasonable choice and new trend for individualized treatment of high-risk patients. "Targeted clearance" of lymph nodes is a hot topic of research [7]. In recent years, based on the concept of membrane anatomy, radical resection of esophageal cancer with total mesorectal excision has been proposed. The tumor is completely removed together with all tissue structures in the esophageal peripheral mesoscopic anatomy, which can improve the R0 resection rate and optimize lymph node dissection to reduce cancer residue, recurrence and metastasis. It is an effective method to improve prognosis [29].

Esophageal cancer surgery is an invasive and high-risk procedure, with a total postoperative complication rate of up to 59% and a 30-day mortality rate of up to 2.4% (39% and 2% for minimally invasive surgery, respectively) [30]. In order to minimize surgical trauma, reduce the body's stress response and the occurrence of complications, reduce the risk of death, and maintain the patient's physiological function and physical fitness, it is emphasized that under the guidance of the concept of Accelerated Recovery after Surgery (ERAS), the methods and pathways provided by the "Expert Consensus on the Application of Accelerated Recovery after Surgery for Esophageal Cancer" and the "Guidelines for Perioperative Treatment of Esophagectomy" recommended by the Association for Accelerated Recovery after Surgery [30] should be followed and applied. Multidisciplinary team collaboration led by surgery should be implemented to provide individualized clinical implementation methods, pathways and a series of optimized plans for different patients, so that perioperative management can be standardized and standardized, so as to improve the efficiency of surgical recovery, relieve the patient's pain, accelerate the patient's smooth and stable recovery, shorten the hospital stay, and improve the prognosis. Given that malnutrition is common among esophageal cancer patients, with a preoperative incidence of approximately 50% to 80% and a

postoperative incidence of up to 60% to 85%, it seriously affects surgical tolerance, safety, and postoperative recovery, and increases the risk of complications and death [31]. Therefore, in recent years, attention has been paid to the full nutritional status assessment of all patients, and nutritional supplementation, support, and treatment are provided according to the degree of risk. Dietary advice, protein, and enteral feeding through tube feeding are provided before surgery to provide patients with nutritional reserves, increase the body's resistance and surgical tolerance, reduce postoperative complications, and promote wound healing. Supplementary parenteral nutrition or immunonutrition is used after surgery to improve nutritional status, reduce adverse reactions to treatment, and promote early recovery of patients.

In the era of precision medicine, with the deepening of the concept of precision, the development of early screening, the popularization and standardization of minimally invasive diagnosis and treatment techniques, the standardization of lymph node dissection, the progress of individualized comprehensive treatment and the implementation of accelerated recovery surgery, the efficacy of esophageal cancer surgery has gradually improved. Mao Yousheng et al. [5] reported 8,181 cases of esophageal cancer treated surgically, with 1-, 3-, and 5-year overall survival rates of 82.6%, 61.6%, and 52.9%, respectively. Therefore, esophageal cancer surgery, which is based on an individualized multidisciplinary comprehensive treatment model with radical surgery as the main treatment, is undergoing a revolutionary change and will develop in the direction of standardization, minimally invasiveness, individualization, and precision.

Comprehensive Health Management of Esophageal Cancer

In the era of precision medicine, with the development of society, economy and modern high-tech, the treatment of esophageal cancer in China has been improved with the new concept of "precision medicine" and the progress of treatment models under its guidance; the promotion and standardization of individualized precision diagnosis and treatment by multidisciplinary team collaboration; the updating and application of diagnostic and treatment equipment, methods and technologies; the standardization, minimally invasive and refined surgical methods and technologies; the standardization, individualization and precision of comprehensive treatment, which have improved the efficacy of esophageal cancer in China, prolonged the survival of patients and improved the quality of life. However, the recognition, compliance and participation of risk population screening are poor, resulting in a low early diagnosis rate; there is still a lack of professional diagnosis and treatment teams (MDT) and standardized and homogeneous quality standard control systems; long-term follow-up monitoring and scientific full-process health management are not in place, which affects the overall efficacy, long-term effects and quality of life of esophageal cancer, and needs to be standardized and improved.

In recent years, in order to realize the "Healthy China 2030" strategic plan, it has been proposed to create a comprehensive and full-cycle health management system that is "patient-centered" and in line with China's national conditions and the characteristics of the times, as a new concept and new model for cancer diagnosis and treatment [32]. The diagnosis, treatment and full-process management of esophageal cancer is a comprehensive treatment strategy and medical management concept. It is a scientific medical comprehensive

process that is patient-centered and transforms from the traditional "diagnosis and treatment-centered" disease management and service model that is limited to hospitals to a "health-centered" all-round and life-cycle modern "health management" new model. It usually covers three major cycles, from pre-hospital (pre-cancer cycle) screening to improve early diagnosis rate; individualized precision diagnosis and treatment and rehabilitation in the hospital (diagnosis and treatment cycle) to improve radical cure and survival rate; to long-term follow-up, monitoring and health management after hospitalization (post-cancer cycle), and finally to the full management of three stages of hospice care, providing patients with a comprehensive, coordinated and coherent medical service, health care guidance and humanistic care management model to restore, maintain and promote the patient's health life index and improve long-term survival benefits [32].

Pre-hospital screening and early diagnosis management; the key is to improve the screening mechanism, optimize the screening process, select the target population, and formulate scientific screening methods and standards to improve the detection rate and early diagnosis rate of precancerous lesions and early esophageal cancer, so as to intervene, treat and follow up as soon as possible. With the formulation of China's "Cancer Prevention and Control Implementation Plan (2019-2022)" and "Healthy China 2030" Outline and its implementation as a national strategy, high-risk population screening is carried out in selected high-incidence areas. In other areas, medical institutions at all levels screen target populations with high-risk factors and stratify them during physical examinations of healthy people and daily clinical work, conduct opportunistic screening and targeted special examinations to improve the accuracy of screening, the detection rate and diagnosis rate of early esophageal cancer. This is a more feasible management strategy at this stage [8], which is the initial stage of the whole process management of esophageal cancer and has received attention and concern.

Precise diagnosis and treatment and rapid rehabilitation management within the hospital; Traditional individual management is limited to the patient's hospitalization and treatment period. The MDT led by the esophageal cancer surgery department conducts precise clinical staging of the patient before surgery. If necessary and possible, pathological histological examination should be obtained to provide accurate pathological staging; a comprehensive and integrated assessment of the severity of the lesion and the possibility of resection, the patient's physical condition and surgical tolerance, the surgical method and safety, etc. [17]; strictly follow the standardized diagnosis and treatment guidelines for esophageal cancer and expert consensus to formulate and implement a reasonable and optimal individualized comprehensive treatment plan, so that the diagnosis and treatment procedures, methods and perioperative rehabilitation management tend to be standardized, minimally invasive, refined and homogenized, so as to improve the efficacy and maximize the benefits to patients. This is also the core stage of the whole process management.

Follow-up monitoring and health management after hospitalization; Patients whose condition is stable after in-hospital treatment, who have basically recovered and meet the discharge criteria or need continued treatment, can be transferred to the primary (community) hospital (tiered diagnosis and treatment and two-way referral) of the medical alliance outside the hospital or stay at home, and be included in the integrated and scientific management system of "health-centered", and conduct regular systematic follow-up and

real-time contact monitoring; assist in follow-up medical treatment, reexamination and rehabilitation; provide psychological, nutritional and health guidance until hospice care; achieve the expected goals of reducing mortality, improving long-term survival rate and quality of life, and improving prognosis. At present, most patients are in a disordered state after discharge, and the long-term follow-up and health management of patients in primary communities and home health care have not received enough attention and reasonable planning arrangements, which directly affects the quality of life and long-term survival rate of patients. Because, after radical surgery and comprehensive treatment, esophageal cancer patients suffer from malnutrition with an incidence of 60% to 85% due to disease consumption, surgical trauma, negative reactions to radiotherapy and chemotherapy, related complications, decreased gastrointestinal function, psychological disorders and other factors; poor physiological function and quality of life; about 70% to 100% of patients experience cancer-related fatigue and slow recovery after surgery; the impact on Health-Related Quality of Life (HRQOL) lasts at least 3 to 6 months, usually in the early stage of 1 to 3 months after surgery, with an initial decline followed by a steady and slow recovery, close to the baseline at 6 months, and most patients return to the baseline state about 1 to 3 years after surgery, reaching the general population value. A population-based study [23] showed that 86% of patients could return to baseline status 5 years after resection. In particular, patients were still in a dangerous period of repeated changes in their condition 1 to 3 months after discharge, and surgery-related complications such as anastomotic stenosis, anemia, diarrhea, indigestion, pneumonia, etc. were likely to occur. Recurrence and metastasis were prone to occur 1 to 2 years after surgery, with a high incidence rate within 2 to 3 years, accounting for more than 80%. Therefore, scientific post-hospital health management of patients after discharge is a continuation of medical services, an important stage and component of the overall management of esophageal cancer, and the implementation of the "Healthy China Action-Cancer Prevention and Control Action Implementation Plan (2023-2030)" to achieve chronic disease health management for the entire population and throughout the life cycle, and to increase the overall 5-year cancer survival rate by 15% to 46.6%. To this end, it is recommended to consider many aspects:

1) Establish an integrated medical community consisting of relevant hospitals, communities, and patients to achieve seamless connection, overall coordination, and realize a medical assistance service system with hierarchical diagnosis and treatment and two-way referral; a professional team will conduct a comprehensive health assessment of the condition of discharged patients, formulate a rehabilitation plan and follow-up system, establish a complete electronic health record and database, and incorporate it into a complete full-process information health management system. Relying on the health management platform built on information technology, the patient's disease awareness, medical assistance, information integration, first-visit referral, continued medical care, follow-up and other services will be integrated in a coherent manner. According to the needs of each patient, "one-to-one" personalized and meticulous health management will be achieved to provide patients with continuous, comprehensive, and holistic services; full-process monitoring, real-time communication, early warning feedback, rehabilitation guidance, health maintenance, and even hospice care will be implemented to achieve personalized electronic health management; in order to promote the standardization, precision, homogenization, and quality improvement of the full-process

management of esophageal cancer.

2) Improve and perfect the follow-up system. Given that recurrence, metastasis, and treatment-related complications and adverse reactions may occur after esophageal cancer surgery and comprehensive treatment, these are the main factors affecting prognosis and quality of life. Emphasize systematic and regular follow-up of the health status of patients after discharge to increase patient compliance, reflect medical humanistic care and follow-up monitoring, help post-hospital health management, and can detect and treat recurrence, metastasis, and related diseases at an early stage, improve the quality of life and long-term survival rate of patients, and are an important part of achieving full-course management. The Guidelines [2] recommend that patients with Tis/T1a esophageal squamous cell carcinoma who have undergone endoscopic resection should undergo follow-up examinations every 3 to 6 months in the first year after surgery, and once a year starting from the second year. Given that the local recurrence rates of early squamous cell carcinoma after ESD and EMR are 11.5% and 0.3%, respectively, most of them recur within 1 year. Therefore, follow-up examinations should be performed once every 3 to 6 months in the first year after surgery, and once a year starting from the second year. For patients who undergo surgical treatment, follow-up visits should be conducted once every three months within 2 years after surgery; once every six months between 2 and 5 years; and once a year after 5 years, in order to detect recurrence, metastasis, and/or metachronous new tumors as early as possible and to intervene and treat them in a timely manner [1]. During the follow-up period, full tracking and monitoring should be implemented, and real-time online or telephone contact should be made. If the patient has any discomfort or symptom warning, the patient should be contacted and fed back in a timely manner, and referral guides should be arranged, and the patient should be accompanied for examinations and assisted in the treatment of related complications and tumor recurrence and metastasis, so as to reduce mortality, improve survival rate, and maintain quality of life. The "Consensus" [12] recommends that appropriate follow-up strategies, follow-up intervals, and examination items be adopted according to the different stages and surgical treatment plans of esophageal squamous cell carcinoma; it is recommended that tumor markers be reviewed and monitored at each follow-up visit, which reflects the proliferation of the tumor and can predict recurrence, thereby assisting in judging the occurrence, recurrence, and efficacy evaluation of the tumor.

3) Strengthen health education, improve the public's awareness of cancer prevention and treatment, and make the core knowledge of cancer prevention and treatment reach more than 80%; improve the self-management awareness of follow-up patients, their understanding of and compliance with the whole process of management; and adjust unhealthy lifestyles and unreasonable eating habits, which are the basic strategies for preventing esophageal cancer. Given that cancer patients are prone to psychological problems, accounting for about 30% to 50%, among which the prevalence of depression is 52.8% and the prevalence of despair is 64.4%, psychological care and counseling for patients and their families should be strengthened to enhance their perseverance and self-confidence in overcoming the disease, maintain an optimistic and healthy life, and actively return to society.

4) Pay attention to and supervise patients to complete follow-up treatment according to the doctor's instructions, guide them to

take medication on time, and promptly detect and deal with adverse reactions to consolidate the therapeutic effect.

5) Nutritional status assessment and support. Given that postoperative gastrointestinal symptoms can last for 6 to 12 months, affecting eating and digestion and absorption, the incidence of malnutrition is approximately 60% to 85%, which reduces tolerance to subsequent treatments and seriously affects patient recovery and prognosis. Therefore, it is important to attach importance to home dietary guidance, a reasonable nutritional diet, combined with oral nutrition and good nutritional support. For those with indwelling feeding tubes, nutritional therapy should be implemented under guidance to help physical recovery and improve and consolidate the therapeutic effect.

6) Provide guidance and assistance in the prevention and treatment of related complications, such as esophageal reflux, anastomotic stenosis, chronic diarrhea, anemia, etc., and intervene and treat them in a timely manner to relieve pain and improve the quality of life; assist in pain management, use medication, physical therapy, and psychological therapy to relieve pain, and choose multimodal analgesia when necessary.

7) Encourage and guide moderate activity and exercise. The NCCN guidelines point out that 70% to 100% of cancer patients receiving treatment may experience cancer-related fatigue symptoms. Gradual and moderate activity and exercise can help the recovery of organ and body functions, relieve fatigue symptoms, and improve physical fitness and strength.

8) Traditional Chinese medicine has the function of balancing yin and yang, enhancing the body's immunity, adjusting the functional activities of organs and tissues, and improving the microenvironment; combined with chemotherapy and radiotherapy, it has the functions of increasing efficacy and reducing toxicity, increasing patients' sensitivity to radiotherapy, reducing adverse reactions and radiation damage, and reducing the side effects of chemotherapy, which can relieve clinical symptoms. It has unique advantages in improving the quality of life, prolonging survival, and improving the expected goals of prognosis.

In summary, the full-course management of esophageal cancer is a comprehensive medical and health management concept, and a standardized esophageal cancer diagnosis and treatment system built with patients at the center. A professional diagnosis and treatment team integrates medical resources to provide patients with a full range of individualized, standardized, high-quality medical services and humanistic care from screening and early diagnosis, accurate diagnosis and treatment, rehabilitation, to follow-up monitoring, in order to improve the quality of life of patients and achieve the goal of long-term healthy survival. This is the most optimized and comprehensive management model for esophageal cancer patients. In recent years, clinical studies at home and abroad have shown that full-course high-quality management can significantly improve the quality of life of esophageal cancer patients and increase the long-term survival rate of patients by more than 50%. Linyi Cancer Hospital officially reported that more than 60% of patients achieved long-term survival and significantly improved their quality of life.

Conclusion

The 21st century, under the guidance of the new concepts of "precision medicine" and "full-process disease management", a multidisciplinary diagnosis and treatment team led by esophageal

cancer surgery is established to collaborate, aiming at a new medical model and strategy of "everything for the patient", "disease-centered to health-centered" and "from disease management to health management". It is a system that runs through the entire process of the disease, from pre-hospital patient screening to improve early diagnosis rate; precise diagnosis and treatment and rapid rehabilitation in the hospital to improve radical cure and survival rate; long-term follow-up and health management after hospitalization, to a dynamic, closed-loop, full-life cycle health management system for hospice care, providing all-round, continuous medical services and health care guidance and management to improve long-term survival rate, reduce mortality rate, maintain quality healthy life, and achieve the expected goals proposed in the "Healthy China 2030" Planning Outline. It is also the trend and strategy for the development of esophageal cancer surgery.

References

1. Bureau of Medical Administration and Management, National Health Commission of the People's Republic of China, Guidelines for the diagnosis and treatment of esophageal cancer (2022 edition), *Chin J Digest Surg.* 2022;21(10):1247-68.
2. Jie H, Wanqing C, Zhaoshen L. Guidelines for screening, early diagnosis and early treatment of esophageal cancer in China (2022, Beijing). *Chin J Digest Surg.* 2022;21(6):677-709.
3. Jianbang L. Science and strategy of screening, early diagnosis and early treatment of upper gastrointestinal cancer. *Progress Clin Med.* 2014;4(3):35-41.
4. Chen W, Sun K, Zheng R, Zeng H, Zhang S, Xia C, et al. Cancer incidence and mortality in China, 2014. *Chin J Cancer Res.* 2018;30(1):1-12.
5. Yousheng M, Shugeng G, Qun W. Epidemiological characteristics and surgical treatment of esophageal cancer in China. *Chin J Oncol.* 2020;42(3):228-33.
6. Han B, Zhong R, Zeng H, Wang S, Sun K, Chen R, et al. Cancer incidence and mortality in China, 2022. *J Nati Cancer Cent.* 2024;4(1):47-53.
7. Guoren L, Jianhua D. Evolution and progress of treatment concepts and models for esophageal cancer in China. *Chin J Thorac Surg.* 2023;10(2):117-25.
8. National Cancer Center, National Clinical Research Center for Cancer. Expert consensus on standard pathways for opportunistic screening of esophageal cancer in physical examination populations based on endoscopy. *Health Examination and Management.* 2023;4(3):220-28.
9. Xiangke L, Qingxia F. Comprehensive management of esophageal cancer from the perspective of domestic and international clinical trials. *E J Transl Med.* 2017;4(5):61-4.
10. Guoren L, Jianhua D. Research progress on early esophageal cancer screening in China. *Chin J Thorac Cardiovasc Surg.* 2021;37(1):52-8.
11. He Z, Ke Y. Precision screening for esophageal squamous cell carcinoma in China. *Chin J Cancer Res.* 2020;32(6):673-82.
12. Longqi C, Xiaofei L, Jianhua F, Song Z, Yin L, Yousheng M, et al. Consensus of Chinese thoracic surgery experts on postoperative follow-up of esophageal squamous cell carcinoma. *Chin J Clin Thorac Cardiovasc Surg.* 2022;29(2):141-9.
13. Early Diagnosis and Early Treatment Group of the Oncology Branch of the Chinese Medical Association. Expert consensus on early diagnosis and early treatment of esophageal cancer in China. *Chin J Oncol.* 2022;44(10):1066-522.
14. National Clinical Research Center for Digestive Diseases (Shanghai), Chinese Society of Digestive Endoscopy. Expert consensus on diagnostic strategies for precancerous conditions and precancerous lesions of

- esophageal squamous cell carcinoma in China. *Chin J Digest Endosc.* 2020;37(12):853-67.
15. Haomiao L, Haibo S, Yan Z. Interpretation of the eighth edition of the AJCC/UICC TNM staging system for esophageal and esophagogastric junction cancer and the main contents of the Chinese version. *Chin J Clin Thorac Cardiovasc Surg.* 2017;24(2):87-92.
 16. National Cancer Center, Chinese Medical Association Thoracic Surgery Branch, Chinese Medical Association Thoracic and Cardiovascular Surgery Branch, etc. Chinese practice guidelines for perioperative diagnosis and treatment of resectable esophageal cancer (2023 edition). *Chin Med J.* 2023;103(33):2552-70.
 17. Zhangju Y, Guoren L. Risk factors, assessment and countermeasures of esophageal cancer surgery. *Chin J Clin Thorac Cardiovasc Surg.* 2016;23(9):851-8.
 18. Early diagnosis and early treatment group of the Oncology Branch of the Chinese Medical Association. Expert consensus on early diagnosis and early treatment of esophageal cancer in China. *Chin J Oncol.* 2022;44(10):1066-522.
 19. Ruiyang S, Zhiyu W, Runyi T. Comprehensive treatment of esophageal cancer with esophageal preservation from a thoracic surgery perspective. *Chin J Clin Thorac Cardiovasc Surg.* 2022;29(2):245-50.
 20. Yousheng M, Shugeng G, Yin L, Xue Q, Li F, Jin DH, et al. Hot topics and prospects of esophageal cancer research in China. *Chin J Gastrointest Surg.* 2023;26(4):307-11.
 21. Zhengdong Z, Kaiyuan J, Dong T. Research progress in comprehensive treatment of locally advanced esophageal cancer. *Cancer Prev Treat.* 2022;35(4):393-8.
 22. Zhentao Y, Lei G, Yueyang Y, Peng T. Advances in comprehensive surgical treatment of esophageal cancer. *Chin J Digest Surg.* 2022;21(1):30-33.
 23. Shah MA, Altorki N, Patel P, Harrison S, Bass A, Abrams JA. Improving outcomes in patients with esophageal cancer. *Nat Rev Clin Oncol.* 2023;20(6):390-407.
 24. Chinese Anti-Cancer Association Tumor Radiotherapy Committee. Chinese Medical Association Radiation Oncology Branch. Expert consensus on radiotherapy combined with immunotherapy for esophageal cancer (2023 edition), *Chin J Radiol Med Protect.* 2023;43(8):575-87.
 25. Chinese Society of Integrated Traditional Chinese and Western Medicine, Expert consensus on the treatment of esophageal cancer with integrated traditional Chinese and Western medicine (2021 edition). *J China-Japan Friendship Hospital.* 2021;35(1):3-7.
 26. Xufeng G, Haoyao J, Rong H. 2015 Surgical treatment data report of esophageal cancer in Shanghai Chest Hospital. *Chin J Clin Thorac Cardiovasc Surg.* 2020;27(9):1070-74.
 27. Zhigang L, Xiaobin Z, Xufeng G. Long-term survival results of surgical treatment of esophageal squamous cell carcinoma: A single-center analysis of Shanghai Chest Hospital. *Chin J Thorac Surg.* 2018;5(2):69-74.
 28. Hanran W, Changqing L, Mingran X. Chinese expert consensus on pneumatic mediastinoscopic esophagectomy for esophageal cancer. *Chin J Clin Thorac Cardiovasc Surg.* 2023;30(10):1367-76.
 29. Guojun W. Application of membrane anatomy concept in radical resection of esophageal cancer. *Chin J Gastrointest Surg.* 2023;26(7):644-9.
 30. Yun W, Zehao W, Yuguang H. Interpretation of the "Guidelines for perioperative treatment of esophagectomy: Recommendations of the Society for Enhanced Recovery After Surgery". *Peking Union Med Coll J.* 2019;10(6):575-81.
 31. Chinese Anti-Cancer Association Tumor Nutrition Committee, Chinese Medical Association Parenteral and Enteral Nutrition Branch. Nutritional treatment guidelines for patients with esophageal cancer. *Electron J Tumor Metab Nutr.* 2020;7(1):32-42.
 32. Ma F, Li LX. Comprehensive and full-cycle health management of cancer. *Chin Med J.* 2024;104(2):100-6.