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Radiation Therapy of Thyroid-related Eye Diseases

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1. Abstract

Thyroid-associated ophthalmopathy (TAO) is an autoimmune disease associated with thyroid-related posterior ocular and perimeter orbital tissue invasive lesions, with a very high incidence of adult orbital disease, with a male and female proportion of about 3:16. Patients with mild diseases have little impact on life, and moderate and severe cases will even lose vision and even blindness, which brings great inconvenience to life. Therefore, effective treatment is very necessary.

2. The Etiology

At present, the etiology and pathogenesis of T AO is not yet clear. The present classical theory is the co-antigen theory. Luo Lifu et al found that TAO patients have obvious fat fiber fat connective tissue hyperplasia, the formation of neovascularization, and cytokines play a role in this pathogenesis [2]. The pathological changes of thyroid-related eye disease are mainly in the connective tissue of the extraocular muscle and orbit, which is characterized by early invasive edema to late tissue degeneration and brofisis. The main characteristics of the activity period are eyeball protrusion, eyelid withdrawal, etc., and some serious cases will lead to vision loss due to edema and compression of the orbital tissue. Some scholars believe that the inflammatory response may play an indispensable role in the course of T AO. There are also a series of studies showing a relationship between inflammatory cells and cytokines and T AO. Studies have confirmed that smoking is one of the high risk factors for the occurrence and development of T AO, and reduces the treatment effect and increased recurrence rate of patients.

3. Clinical Diagnosis

T AO is an immune disease. The clinical diagnosis of thyroid-related eye diseases is mainly based on the standard proposed in B artley 1995 years: it can be said that the standard diagnosis of TAO is generally easy to obtain. But to continue to grade, according to the severity of the choice of the corresponding treatment method. The N OSPECS system was used earlier to assess the clinically of its severity, only grading the disease severity but did not provide an assessment of the progression of ocular inflammation. Until 1999, the E UGOGO system, including assessment of severity of eye disease and inflammatory activity using C AS score and severity using N OSPECS grading criteria. According to the 2016 E UGOGO criteria, here only the moderate to severe evaluation criteria, there should be two or the following conditions: eyelid withdrawal (2mm), moderate to severe soft tissue imaging criteria, 3mm eyeball protrusion, stable or intermittent or revicasual corneal exposure [3].

In addition, imaging examination is a rare auxiliary inspection means at present. CT can directly show both extraocular muscle and intraorbadiital pose tissue changes. Quantitative analysis of extraocular muscle morphology in CT imaging (total cross-sectional area / orbital area ratio) was positively correlated with CAS score, and eye prominence showed no correlation with CAS score.

By collecting image analysis, Weikunqiao et al. indicated that the total cross-section area of the maximum extraocular muscle was positively associated with CAS [7]. CT is more focused on observing anatomical structural changes, and the assessment of functional alterations in the early stage of the disease requires further investigation in large samples. Most C T images can clearly show extraocular muscle thickening, while M RI images can also show any muscle edema. This assists clinicians better in determining the severity of the patient's condition.

4. Radiotherapy and Injury

Radiation therapy is the dominant second-line treatment of the 2016EUGOGO active GO. [3, 9]with orbital radiotherapy may be considered when hormone therapy is ineffective and the disease is still active.In Fan Yanfei's study, the efficiency of postballoon radiotherapy was 78%, and it was consistent with foreign studies [5]. Studies have suggested that the retroorbital IMRT is a feasible option [11].

Radiotherapy Post-Ball radiotherapy has been used to treat T AO for more than half a century. The protocol was a total dose of 20cGy and was completed 10 times in 2 weeks. Orbital radiotherapy is generally well tolerated and safe, but is relatively contraindicated for [9,10] in patients under 35 years or with systemic vascular disease.

The mechanism of action of radiotherapy is to use the radiosensitivity of lymphocytes to attenuate the further development of the orbital disease by inhibiting the inflammatory response. Studies have shown that post-globular radiation therapy has a better ability to improve extraocular muscle activity [1]. Special attention should be paid to the protection of the lens, retina and other important dangerous organs to avoid unnecessary radiation damage. MRI can be used as an important means to predict the efficacy after TAO radiotherapy. Now T2 map-ping MRI has begun to study the extraocular muscle and has demonstrated that T2 values associate [8] with the immunosuppressive efficacy of TAO.

5. Summary

As the etiology and mechanism of action of thyroid-related eye disease influence multiple environmental, genetic and immune factors, the randomized study by Marcocci et al suggested that the combination therapy of radiotherapy and high-dose systemic cocorticoids has better efficacy than radiation therapy for severe Graves's eye disease alone. [4] Radiotherapy has always been an important adjuvant to treating TAO and will play a more important role in the future. From the mechanism of action to the principle of treatment, with the addition of molecular imaging and genomics in the future, we will have a new understanding of the occurrence and development of diseases. In addition, the treatment means are also expanding, and the treatment is a single department, with the strengths of multiple departments, more personalized and precise treatment plans can be put forward for patients to bring better quality of life to patients.

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