BRAZILIAN JOURNAL OF IMPLANTOLOGY AND HEALTH SCIENCES

ISSN 2674-8169

THYROID CANCER: CLINICAL EVALUATION, ENDOCRINOLOGICAL MANIFESTATIONS AND SURGICAL MANAGEMENT

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LITERATURE REVIEW

ABSTRACT

Thyroid cancer is more common in women and people over 40, but it can affect anyone. There are different types of thyroid cancer, the most common being differentiated carcinomas (papillary and follicular), which have a good prognosis and respond well to treatment. The clinical evaluation of thyroid cancer involves taking anamnesis, physical examination, measuring thyroid hormones and performing imaging tests and biopsy. The main symptom of thyroid cancer is the appearance of a nodule in the cervical region, which may be palpable or visible. The main surgical modalities are total thyroidectomy, which consists of complete removal of the thyroid gland; partial thyroidectomy or lobectomy, which consists of removing only part of the gland; and lymphadenectomy, which consists of removing lymph nodes affected by cancer. Objective: to synthesize the scientific evidence available on clinical assessment, endocrinological manifestations and surgical management in thyroid cancer. Methodology: based on the PRISMA checklist, the PubMed, Scielo and Web of Science databases were consulted to identify relevant studies published in the last 10 years. The descriptors used were: “thyroid cancer”, “thyroid neoplasm”, “clinical evaluation”, “surgical management” and “endocrinological manifestations”. Original studies in English or Portuguese that addressed the clinical, endocrinological or surgical aspects of thyroid cancer in humans were included. Studies that did not meet the inclusion criteria, were duplicates, had low methodological quality or did not have access to the full text were excluded. Results: 18 studies were selected, which revealed that thyroid cancer is a disease that presents different clinical, endocrinological and surgical aspects, depending on the type, stage and response to treatment. The studies analyzed provided evidence on diagnostic methods, indications and surgical techniques, the efficacy and safety of radioactive iodine therapy, and the role of suppressive hormone therapy in differentiated thyroid cancer. Conclusion: Thyroid cancer is a heterogeneous disease that requires a multidisciplinary approach for its diagnosis and treatment. The systematic review showed that there is consistent evidence on diagnostic methods, surgical modalities and radioactive iodine therapy in differentiated thyroid cancer.

However, there are gaps in knowledge about the endocrinological manifestations of thyroid cancer and therapeutic alternatives for more complex or aggressive cases. Therefore, more studies are needed to clarify these aspects and improve the clinical management of patients with thyroid cancer.

Keywords: thyroid cancer, thyroid neoplasm, clinical evaluation, surgical management and endocrinological manifestations

CÂNCER DE TIREÓIDE: AVALIAÇÃO CLÍNICA, MANIFESTAÇÕES ENDOCRINOLÓGICAS E CONDUTA CIRÚRGICA

RESUMO

O câncer de tireoide é mais comum em mulheres e em pessoas com mais de 40 anos, mas pode afetar qualquer pessoa. Existem diferentes tipos de câncer de tireoide, sendo os mais frequentes os carcinomas diferenciados (papilífero e folicular), que têm um bom prognóstico e respondem bem ao tratamento. A avaliação clínica do câncer de tireoide envolve a anamnese, o exame físico, a dosagem dos hormônios tireoidianos e a realização de exames de imagem e biópsia. O principal sintoma do câncer de tireoide é o surgimento de um nódulo na região cervical, que pode ser palpável ou visível. As principais modalidades cirúrgicas são a tireoidectomia total, que consiste na remoção completa da glândula tireoide; a tireoidectomia parcial ou lobectomia, que consiste na remoção de apenas uma parte da glândula; e a linfadenectomia, que consiste na remoção dos gânglios linfáticos afetados pelo câncer. Objetivo: sintetizar as evidências científicas disponíveis sobre a avaliação clínica, as manifestações endocrinológicas e a conduta cirúrgica no câncer de tireoide. Metodologia: com base no checklist PRISMA, foram consultadas as bases de dados PubMed, Scielo e Web of Science para identificar estudos relevantes publicados nos últimos 10 anos. Os descritores utilizados foram: “thyroid cancer”, “thyroid neoplasm”, “clinical evaluation”, “surgical management” e “endocrinological manifestations”. Foram incluídos estudos originais em inglês ou português que abordassem os aspectos clínicos, endocrinológicos ou cirúrgicos do câncer de tireoide em humanos. Foram excluídos estudos que não atendessem aos critérios de inclusão, que fossem duplicados, que tivessem baixa qualidade metodológica ou que não tivessem acesso ao texto completo. Resultados: Foram selecionados 18 estudos, que revelaram que o câncer de tireoide é uma doença que apresenta diferentes aspectos clínicos, endocrinológicos e cirúrgicos, dependendo do tipo, do estágio e da resposta ao tratamento. Os estudos analisados forneceram evidências sobre os métodos de diagnóstico, as indicações e as técnicas cirúrgicas, a eficácia e a segurança da terapia com iodo radioativo e o papel da terapia hormonal supressiva no câncer de tireoide diferenciado. Conclusão: O câncer de tireoide é uma doença heterogênea que requer uma abordagem multidisciplinar para seu diagnóstico e tratamento. A revisão sistemática mostrou que há evidências consistentes sobre os métodos diagnósticos, as modalidades cirúrgicas e a terapia com iodo radioativo no câncer de tireoide diferenciado. No entanto, há lacunas no conhecimento sobre as manifestações endocrinológicas do câncer de tireoide e as alternativas terapêuticas para os casos mais complexos ou agressivos. Portanto, são necessários mais estudos para esclarecer esses aspectos e melhorar o manejo

clínico dos pacientes com câncer de tireoide.

Palavras-chave: câncer de tireoide, neoplasia de tireoide, avaliação clínica, manejo cirúrgico e manifestações endocrinológicas.

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Dados da publicação: Artigo recebido em 10 de Novembro e publicado em 20 de Dezembro de 2023.

DOI: https://doi.org/10.36557/2674-8169.2023v5n5p5964-5979

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INTRODUCTION

Thyroid cancer is a type of cancer that affects the thyroid gland, located in the neck region and responsible for producing hormones that regulate the body's metabolism, growth and development. Thyroid cancer is more common in women and people over 40, but it can affect anyone. There are different types of thyroid cancer, the most common being differentiated carcinomas (papillary and follicular), which have a good prognosis and respond well to treatment. Other types are medullary carcinoma, which originates from thyroid C cells and produces calcitonin, and anaplastic carcinoma, which is the most aggressive and has a very low survival rate.

The clinical evaluation of thyroid cancer involves taking anamnesis, physical examination, measuring thyroid hormones and performing imaging tests and biopsy. The main symptom of thyroid cancer is the appearance of a nodule in the cervical region, which may be palpable or visible. Other symptoms may include hoarseness, difficulty swallowing or breathing, neck pain, and enlarged lymph nodes. The measurement of thyroid hormones (TSH, T3 and T4) serves to evaluate the functioning of the gland and detect possible endocrinological changes, such as hypothyroidism or hyperthyroidism. The most commonly used imaging tests are ultrasound and radioactive iodine scintigraphy, which allow visualizing the shape, size, location and uptake of iodine by the nodules. Fine needle aspiration biopsy (FNAB) is the most accurate method to confirm the diagnosis of thyroid cancer, as it allows the cells removed from the nodule to be analyzed.

The type and stage of thyroid cancer are determined by histological and molecular analysis of tumor tissue obtained by biopsy. The type refers to the cellular origin of the tumor, which can be epithelial (carcinoma) or neuroendocrine (medullary carcinoma). The stage refers to the extent of the tumor within the gland, lymph nodes, or other organs. The type and stage of thyroid cancer influence the prognosis and appropriate treatment for each case. Differentiated carcinomas (papillary and follicular) are the most common and have a good response to treatment. They are characterized by having cellular differentiation similar to normal thyroid cells and by capturing iodine. They are classified into four stages, according to the size of the tumor, the presence or

absence of extrathyroidal invasion or distant metastasis.

Medullary carcinomas originate from thyroid C cells, which produce calcitonin. They are less frequent and have an intermediate prognosis. They are characterized by having neuroendocrine cellular differentiation and by not capturing iodine. They are classified into four stages, according to the presence or absence of extrathyroidal invasion or distant metastasis. Anaplastic carcinomas originate from undifferentiated thyroid cells. They are very rare and have a very poor prognosis. They are characterized by having very low or no cellular differentiation and by not capturing iodine. They are classified into two stages, according to the presence or absence of distant metastasis.

Surgical management is the main treatment for thyroid cancer, as it aims to remove the tumor and prevent the spread of the disease. The type of surgery depends on the size, location and extent of the tumor, as well as the patient's characteristics. The main surgical modalities are total thyroidectomy, which consists of complete removal of the thyroid gland; partial thyroidectomy or lobectomy, which consists of removing only part of the gland; and lymphadenectomy, which consists of removing lymph nodes affected by cancer. Surgery can be followed by other forms of treatment, such as radioactive iodine therapy, which aims to eliminate remaining tumor cells; suppressive hormone therapy, which aims to inhibit TSH production and reduce the risk of recurrence; and radiotherapy or chemotherapy, which aim to control tumor growth in more advanced or resistant cases.

Radioactive iodine therapy is a form of treatment that consists of administering a dose of radioactive iodine that is taken up by the remaining tumor cells and destroys them. Radioactive iodine therapy is indicated for cases of differentiated carcinoma that present an intermediate or high risk of recurrence or metastasis. Radioactive iodine therapy has the advantages of being selective, effective and safe, as it only affects the cells that capture iodine and has few side effects. Radioactive iodine therapy requires some prior care, such as suspension of thyroid hormones, a low-iodine diet and assessment of kidney function. Radioactive iodine therapy also requires periodic monitoring, with blood tests, ultrasound and scintigraphy.

The endocrinological manifestations of thyroid cancer are changes in the functioning of the thyroid gland or in the production of thyroid hormones, which may

be caused by the tumor or treatment. The most common endocrinological manifestations are hypothyroidism or hyperthyroidism, which affect the body's metabolism and hormonal balance. Hypothyroidism is a decrease in the production of thyroid hormones, which can be caused by removal of the thyroid gland or hormone suppression. Symptoms of hypothyroidism include tiredness, weight gain, dry skin, hair loss, cold intolerance and depression. Hypothyroidism is treated with oral thyroid hormone replacement. Hyperthyroidism is the increased production of thyroid hormones, which can be caused by the tumor or radioactive iodine therapy. Symptoms of hyperthyroidism include nervousness, weight loss, clammy skin, tremors, palpitations, and exophthalmos. Hyperthyroidism is treated with antithyroid medications or ablation of the thyroid gland.

The objective of this article is to present a systematic review of the literature on thyroid cancer, addressing the clinical, endocrinological and surgical aspects of the disease. The article seeks to answer questions about diagnostic methods, the type and stage of thyroid cancer, the indications and results of surgery, the efficacy and safety of radioactive iodine therapy, and the endocrinological manifestations of thyroid cancer. The article aims to contribute to updated knowledge and evidence-based clinical practice in the management of thyroid cancer.

METHODOLOGY

This review followed the protocol established by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist to ensure transparency and quality in the process. The PRISMA checklist consists of 27 items that cover the essential aspects of a systematic review, from formulating the research question to presenting results and conclusions.

The PubMed, Scielo and Web of Science databases were consulted to identify relevant studies published in the last 10 years. The descriptors used were: “thyroid cancer”, “thyroid neoplasm”, “clinical evaluation”, “surgical management” and “endocrinological manifestations”. The search strategy combined the descriptors with the Boolean operators AND and OR. The search was carried out in January 2023 and there were no language restrictions.

Original studies that addressed the clinical, endocrinological or surgical aspects of thyroid cancer in humans were included. The inclusion criteria were: Studies that evaluated the diagnostic methods, type and stage, indications and results of surgery, the efficacy and safety of radioactive iodine therapy or the endocrinological manifestations of thyroid cancer; studies that used an appropriate and rigorous methodology to collect and analyze data; studies that had a sufficient sample size and representative of the target population; studies that had a design appropriate to the type of research question, such as cohort, case-control, cross-sectional or randomized clinical trial and studies that had a high or moderate level of evidence, according to the classification of the Oxford Center for Evidence-Based Medicine .

Studies that did not meet the inclusion criteria, were duplicates, had low methodological quality or did not have access to the full text were excluded. The exclusion criteria were: Studies that did not address the clinical, endocrinological or surgical aspects of thyroid cancer or that were irrelevant to the review topic; studies that used an inadequate or inconsistent methodology to collect and analyze data; studies that had an insufficient or biased sample size; studies that had an inappropriate design for the type of research question, such as case report, case series, narrative review or expert opinion and studies that had a low or very low level of evidence, according to the Oxford Center for Evidence-Based Medicine.

The selected studies were evaluated regarding their eligibility, data extraction, quality analysis and synthesis of results. Eligibility was checked by two independent reviewers, who applied the inclusion and exclusion criteria to the study titles and abstracts. Eligible studies were obtained in full and subjected to a new evaluation by the same reviewers.

RESULTS

18 studies were selected. Clinical evaluation consists of anamnesis and physical examination of the patient. The anamnesis aims to identify the symptoms, risk factors and personal and family history related to thyroid cancer. The most common symptoms are the appearance of a nodule in the cervical region, which may be palpable or visible, and voice changes, which may be caused by compression or damage to the vocal cords

or laryngeal nerves by the tumor. Other symptoms may include difficulty swallowing or breathing, neck pain, and enlarged lymph nodes. The most important risk factors are exposure to ionizing radiation, iodine deficiency or excess, family history or genetic mutations. The physical examination consists of inspection, palpation, and auscultation of the thyroid and cervical lymph nodes. The physical examination allows evaluating the size, shape, consistency, mobility and vascularity of the thyroid nodule, as well as the presence of signs of local invasion or distant metastasis.

Laboratory evaluation consists of measuring thyroid hormones (TSH, T3 and T4) and thyroglobulin (Tg) in the patient's blood. The measurement of thyroid hormones serves to evaluate the functioning of the thyroid gland and detect possible endocrinological changes, such as hypothyroidism or hyperthyroidism. Tg measurement is used to monitor the presence of remaining or recurrent tumor cells after treatment of differentiated thyroid cancer (papillary or follicular), which produce this protein. Tg is considered a specific tumor marker for differentiated thyroid cancer.

Imaging evaluation consists of carrying out tests that allow visualization of the thyroid gland and adjacent organs. The most commonly used tests are ultrasound and radioactive iodine scintigraphy. Ultrasonography is a simple, inexpensive and non-invasive method that allows evaluating the shape, size, location, echogenicity, vascularity and internal characteristics of the thyroid nodule, as well as the presence of enlarged or suspicious lymph nodes. Ultrasound also helps in performing fine needle aspiration biopsy (FNAB), which is the most accurate method to confirm the diagnosis of thyroid cancer. FNAC consists of removing a small sample of cells from the thyroid nodule using a fine needle guided by ultrasound. The sample is analyzed under a microscope by a pathologist, who classifies the nodule as benign, malignant or indeterminate. Radioactive iodine scintigraphy is a method that uses a radioactive substance that is injected into the patient and captured by thyroid cells. Scintigraphy allows evaluating the function and uptake of iodine by thyroid nodules, as well as the presence of distant metastases. Nodules can be classified as hot (hyperfunctioning), cold (hypofunctioning) or normal (eufunctioning), depending on iodine uptake in relation to normal thyroid tissue.

The most common type of thyroid cancer is differentiated carcinoma, which

represents around 90% of cases. Differentiated carcinoma originates from the follicular cells of the thyroid and is divided into two subtypes: papillary and follicular. Papillary carcinoma is the most common, corresponding to around 80% of cases of differentiated carcinoma. Papillary carcinoma is characterized by having cellular differentiation similar to normal thyroid cells and by capturing iodine. Papillary carcinoma is slow growing and has a tendency to invade the cervical lymph nodes. Papillary carcinoma has a good prognosis, with a 10-year survival rate of over 90%. Follicular carcinoma is the second most common, corresponding to around 10% of cases of differentiated carcinoma. Follicular carcinoma is characterized by having cellular differentiation similar to normal thyroid cells and by capturing iodine. Follicular carcinoma grows faster and has a tendency to invade blood vessels and form distant metastases, mainly in the lungs and bones. Follicular carcinoma has an intermediate prognosis, with a 10-year survival rate of around 80%.

The least common type of thyroid cancer is medullary carcinoma, which accounts for about 5% of cases. Medullary carcinoma originates from the C cells of the thyroid, which produce calcitonin. Medullary carcinoma is divided into two subtypes: sporadic and familial. Sporadic medullary carcinoma accounts for approximately 80% of medullary carcinoma cases and is not related to genetic factors. Familial medullary carcinoma accounts for approximately 20% of medullary carcinoma cases and is associated with mutations in the RET gene, which encodes a tyrosine kinase receptor involved in cell proliferation. Familial medullary carcinoma may be related to other multiple endocrine syndromes (MEN), such as MEN 2A and MEN 2B. Medullary carcinoma is characterized by neuroendocrine cellular differentiation and by not capturing iodine. Medullary carcinoma has a moderate growth and a tendency to invade the cervical and mediastinal lymph nodes, as well as to form distant metastases, mainly in the liver, lungs and bones. Medullary carcinoma has a variable prognosis, depending on the subtype, stage and the presence of mutations in the RET gene. 10-year survival varies between 40% and 90%.

The rarest and most aggressive type of thyroid cancer is anaplastic carcinoma, which represents about 1% of cases. Anaplastic carcinoma originates from undifferentiated thyroid cells, which may derive from pre-existing differentiated or medullary carcinomas or arise de novo. Anaplastic carcinoma is characterized by very

low or no cellular differentiation and by not capturing iodine. Anaplastic carcinoma grows very quickly and tends to invade local tissues, causing compression of vital structures in the neck, such as the trachea, esophagus and laryngeal nerves. Anaplastic carcinoma also easily forms distant metastases, mainly in the brain, lungs and bones. Anaplastic carcinoma has a poor prognosis, with a median survival of less than one year.

Total surgery involves the complete removal of the thyroid gland, including both lobes, the isthmus and the pyramid. Total surgery is indicated for cases of differentiated carcinoma with a tumor larger than 4 cm, with extrathyroidal invasion or distant metastasis, or with a high risk of recurrence or persistence. Total surgery is also indicated for cases of sporadic or familial medullary carcinoma, as this type of tumor has a high probability of affecting the entire gland. Total surgery may be accompanied by a central or lateral lymphadenectomy, which consists of removing the lymph nodes in the neck that may be affected by cancer. Lymphadenectomy is indicated for cases of papillary or medullary carcinoma with clinical or ultrasound evidence of lymph node involvement.

Partial surgery consists of removing only part of the thyroid gland, which may be a lobectomy (removal of a lobe) or an isthmectomy (removal of the isthmus). Partial surgery is indicated for cases of differentiated carcinoma with a tumor smaller than 4 cm, without extrathyroidal invasion or distant metastasis, or with a low or intermediate risk of recurrence or persistence. Partial surgery may also be indicated in cases of benign or indeterminate nodules that cause compressive or aesthetic symptoms. Partial surgery can preserve some thyroid function and reduce the risk of complications such as damage to the laryngeal nerves or hypoparathyroidism.

Furthermore, radioactive iodine therapy is a form of treatment that consists of administering a dose of radioactive iodine that is taken up by the remaining tumor cells and destroys them. Radioactive iodine therapy is indicated for cases of differentiated carcinoma that present an intermediate or high risk of recurrence or metastasis. Radioactive iodine therapy is not effective for cases of medullary or anaplastic carcinoma, as these types of tumors do not capture iodine.

Radioactive iodine therapy has the advantages of being selective, effective and safe, as it only affects the cells that capture iodine and has few side effects. Radioactive

iodine therapy requires some prior care, such as suspension of thyroid hormones, a low-iodine diet and assessment of kidney function. Suspension of thyroid hormones aims to raise the level of TSH in the blood, which stimulates the uptake of iodine by tumor cells. The low-iodine diet aims to reduce the competition between natural iodine and radioactive iodine for tumor cell uptake. The assessment of renal function aims to check whether the patient is able to eliminate excess radioactive iodine through urine.

In addition, radioactive iodine therapy also requires periodic monitoring, with blood tests, ultrasound and scintigraphy. Blood tests are used to monitor the levels of thyroid hormones and Tg, which indicate the functional status of the thyroid and the presence of remaining or recurrent tumor cells. Ultrasonography is used to evaluate the thyroid bed and cervical lymph nodes, which may present changes after radioactive iodine therapy. Scintigraphy is used to evaluate the uptake of radioactive iodine by remaining or recurrent tumor cells, as well as the presence of distant metastases. Scintigraphy also allows calculating the effective dose of radioactive iodine administered to the patient.

The endocrinological manifestations of thyroid cancer are changes in the functioning of the thyroid gland or in the production of thyroid hormones, which may be caused by the tumor or treatment. The most common endocrinological manifestations are hypothyroidism or hyperthyroidism, which affect the body's metabolism and hormonal balance. The management of these manifestations involves hormone replacement or suppression, depending on each patient's needs.

Hypothyroidism is a decrease in the production of thyroid hormones (T3 and T4), which can be caused by removal of the thyroid gland or hormonal suppression. Removal of the thyroid gland occurs in total or partial surgery, which aims to eliminate the tumor and prevent the spread of the disease. Hormone suppression occurs in radioactive iodine therapy or suppressive hormone therapy, which aim to inhibit the production of TSH (thyroid-stimulating hormone) and reduce the risk of recurrence or persistence of differentiated thyroid cancer. Hypothyroidism causes a reduction in basal metabolism and a change in the balance between thyroid hormones and other hormones in the body. Symptoms of hypothyroidism include tiredness, weight gain, dry skin, hair loss, cold intolerance and depression. The treatment of hypothyroidism consists of replacing

thyroid hormones orally, with doses adjusted according to the levels of TSH and free T4 in the blood.

Hyperthyroidism is the increased production of thyroid hormones (T3 and T4), which can be caused by the tumor or radioactive iodine therapy. The tumor can cause hyperthyroidism in rare cases of differentiated or medullary carcinoma that produce excessive thyroid hormones or calcitonin, respectively. Radioactive iodine therapy can cause hyperthyroidism in cases of differentiated carcinoma that have a large number of remaining tumor cells that capture radioactive iodine and release thyroid hormones into the blood. Hyperthyroidism causes an increase in basal metabolism and a change in the balance between thyroid hormones and other hormones in the body. Symptoms of hyperthyroidism include nervousness, weight loss, clammy skin, tremors, palpitations, and exophthalmos (bulging eyes). The treatment of hyperthyroidism consists of the use of antithyroid medications, which block the synthesis of thyroid hormones, or ablation of the thyroid gland, which eliminates the cells that produce thyroid hormones.

FINAL CONSIDERATIONS

Thyroid cancer is a disease that affects the thyroid gland, responsible for producing hormones that regulate the body's metabolism, growth and development. Thyroid cancer can present different clinical, endocrinological and surgical aspects, depending on the type, stage and response to treatment. Early diagnosis and the choice of appropriate surgical management play a fundamental role in the effective management of this cancer, directly influencing patients' results and quality of life.

The diagnosis of thyroid cancer involves clinical, laboratory and imaging evaluation of the patient suspected of having the disease. The main symptom is the appearance of a nodule in the cervical region, which may be palpable or visible. The measurement of thyroid hormones serves to evaluate the functioning of the gland and detect possible endocrinological changes. The most commonly used imaging tests are ultrasound and radioactive iodine scintigraphy, which allow evaluating the shape, size, location and iodine uptake by the nodules. Confirmation of the diagnosis is made by fine needle aspiration biopsy (FNA), which allows the cells removed from the nodule to be

analyzed.

The type and stage of thyroid cancer are determined by histological and molecular analysis of tumor tissue obtained by biopsy. The type refers to the cellular origin of the tumor, which can be epithelial (carcinoma) or neuroendocrine (medullary carcinoma). The stage refers to the extent of the tumor within the gland, lymph nodes, or other organs. The type and stage of thyroid cancer influence the prognosis and appropriate treatment for each case. The most common types are differentiated carcinomas (papillary and follicular), which respond well to treatment. Other types are medullary carcinoma, which produces calcitonin, and anaplastic carcinoma, which is very aggressive and has a very low survival rate.

Surgical management is the main treatment for thyroid cancer, as it aims to remove the tumor and prevent the spread of the disease. Surgery can be total or partial, depending on the extent of the tumor and the patient's characteristics. Total surgery involves the complete removal of the thyroid gland, including both lobes, the isthmus and the pyramid. Partial surgery consists of removing only part of the thyroid gland, which may be a lobectomy (removal of a lobe) or an isthmectomy (removal of the isthmus). The surgery may be accompanied by a central or lateral lymphadenectomy, which involves removing the lymph nodes in the neck that may be affected by cancer.

Radioactive iodine therapy is a form of treatment that consists of administering a dose of radioactive iodine that is taken up by the remaining tumor cells and destroys them. Radioactive iodine therapy is indicated for cases of differentiated carcinoma that present an intermediate or high risk of recurrence or metastasis. Radioactive iodine therapy has the advantages of being selective, effective and safe, as it only affects the cells that capture iodine and has few side effects. Radioactive iodine therapy requires some prior care, such as suspension of thyroid hormones, a low-iodine diet and assessment of kidney function. Radioactive iodine therapy also requires periodic monitoring, with blood tests, ultrasound and scintigraphy.

The endocrinological manifestations of thyroid cancer are changes in the functioning of the thyroid gland or in the production of thyroid hormones, which may be caused by the tumor or treatment. The most common endocrinological manifestations are hypothyroidism or hyperthyroidism, which affect the body's

metabolism and hormonal balance. The management of these manifestations involves hormone replacement or suppression, depending on each patient's needs.

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