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Total Elbow Arthroplasty

QUESTIONS FOR THE SPECIALIST

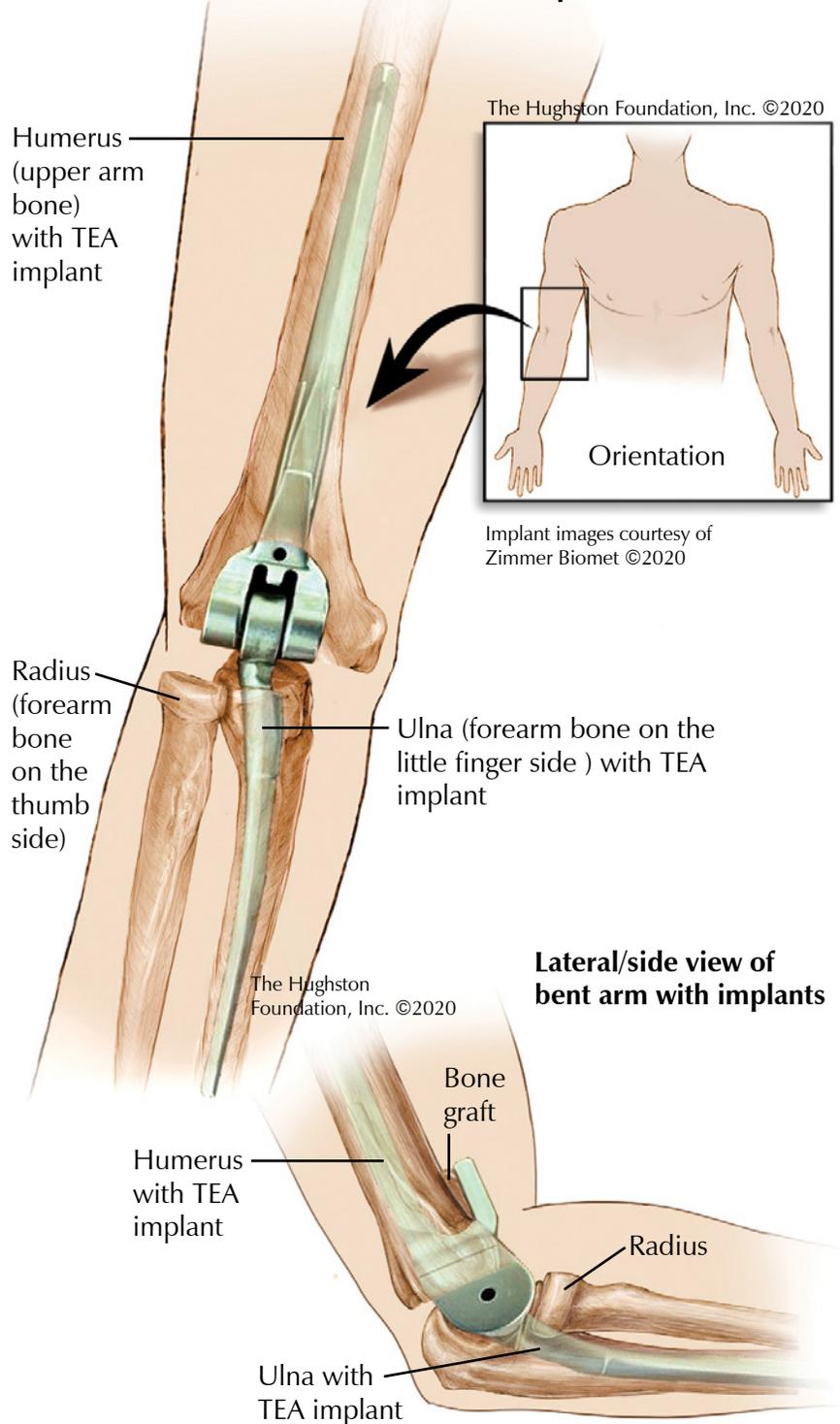
Total elbow arthroplasty (TEA), also called total elbow replacement, is a surgical procedure that helps to relieve pain and maintain motion in an arthritic or injured elbow joint. There are 3 arm bones that make up the elbow joint: the humerus or the upper arm bone; the ulna, which is the lower forearm bone on the little finger side; and the radius that is the larger forearm bone on the thumb side (**Fig.**). TEA is an alternative treatment to elbow arthroscopy (surgery through small incisions in the skin), synovectomy (removal of the synovial tissue surrounding a joint) or internal fixation for traumatic injuries (a surgical procedure that stabilizes bones using devices such as metal plates, pins, rods, screws, or wires), and other motion preserving procedures. Depending on your age, condition, and activity level, your doctor may recommend TEA rather than other treatment options.

Why does my elbow hurt?

Elbow arthritis is caused by degeneration of the cartilage, producing a painful, stiff joint that can affect your quality of life. Whereas arthritis in the knee and hip often results from normal wear and tear of the joint due to aging, elbow arthritis most commonly occurs after trauma to the elbow, following a fracture about the elbow

Fig. Total elbow arthroplasty (TEA)

Anterior/front view of arm with implants



or chronic instability. Patients with rheumatoid arthritis can experience joint degeneration due to the inflammation in the joint. Only a small percentage of elbow arthritis arises from just wear and tear of the joint alone.

What is the treatment for elbow arthritis?

Initially, physicians treat elbow arthritis nonsurgically with anti-inflammatory medications, physical therapy, bracing, steroid injections, and orthobiologics. If these nonsurgical treatments fail to provide pain relief and the arthritis continues to affect your ability to do everyday activities, there are surgical options to consider. Some alternative surgical treatments to help relieve your pain include: elbow arthroscopy to remove debris; ulnohumeral interposition arthroplasty involves surgically adding new tissue between the damaged surfaces of the elbow joint; elbow fusion that permanently fuses the joint together; or joint replacement.

Elbow fusion is rarely performed or recommended because although it provides pain relief, it eliminates motion at the joint. Therefore, an elbow fusion can severely limit a patient's ability to perform daily activities, such as personal hygiene. Elbow arthroscopic treatments may be an additional option, but these procedures may only temporarily relieve pain. TEA gives patients another option in managing painful and debilitating elbow arthritis.

What is total elbow arthroplasty (TEA)?

The goals of TEA are to alleviate pain and regain range of motion, to help improve your quality of life. Surgeons perform TEA by removing arthritic cartilage and bone from the elbow joint and replacing it with metal and plastic components. Additionally, this allows patients to perform activities of daily living they would not have been able to do otherwise. A downside of TEA is the indefinite restriction of lifting weight that exceeds 10 pounds.

Am I a candidate for TEA?

If you have painful arthritis and nonsurgical treatment has failed, you may want to talk to your doctor about TEA. You are a good candidate for elbow replacement if you have maintained elbow motion but continue to have severe pain or instability despite nonsurgical care. Typically, older patients over the age of 65 with less demand on their arms are good candidates for surgery. However, every patient is unique; therefore, your doctor will evaluate you and consider your goals and lifestyle to determine your best course of treatment.

TEA is not recommended if you have an active or prior infection in the elbow joint, inadequate bone to support the implants or neuromuscular disease that impairs muscles resulting in poor muscle tone and function around the elbow. Additionally, it is not recommended in active patients younger than the age of 65 and in patients

who have had a prior olecranon osteotomy, a surgical procedure to the elbow's outer bony prominence.

How is the surgery performed?

Orthopaedic surgeons typically perform TEA using general anesthesia. A nerve block to the upper extremity can be used as a supplement to aid in postoperative pain control. The doctor places a tourniquet around the upper arm to help control bleeding and improve visualization during surgery. The surgeon makes an incision on the back of the arm, over the elbow joint. Once dissection is performed, the humerus and ulna bones are prepared for the implants by removing the abnormal, damaged bone. The surgeon then prepares the bones, which allows for placement of the metal and plastic components to recreate the elbow joint. After the implants are placed, the surgeon tests the range of motion of the elbow. Next, the incisions are closed with sutures or staples and the elbow is placed into a well-padded splint.

What happens after surgery?

After surgery, you may be discharged the same day or spend the night in the hospital. After you go home, your physician will give you a strict regimen to keep the arm elevated and to perform finger range of motion exercises to help with swelling and improve wound healing. You will remain nonweightbearing in the splint for 2 to 4 weeks. At around 2 weeks, you will have the splint and sutures removed. Following surgery, there is a life-long weight lifting restriction of less than 10 pounds. Therapy will be initiated following surgery, focusing on range of motion. Physical therapy protocols can vary depending on your surgeon's preference.

What are the potential complications?

In general, problems that can arise from any surgery include infection, blood loss, and anesthesia related complications. Wound healing can be a problem, especially in higher-risks patients who are diabetic or have a peripheral vascular disease (poor circulation) and those who continue to smoke. Complications specific to TEA include loosening of the implants, wound healing problems, instability of the components, nerve injury, and fracture around the implants. As in all total joint replacements, the plastic component between the metal devices can wear out, which could result in loosening of the implant from the bone. This typically requires revision surgery to replace the implants. Implant failure can result if the bone fails to heal to the metal components.

What are the typical outcomes of TEA?

Patients typically have pain relief and maintain range of motion after TEA. For specific patients TEA has good outcomes, often with 90% experiencing a 10-year implant survival rate. Even with the possibility of complications, TEA implants continue to evolve and outcomes are improving.

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Plantar Fasciitis: A Painful Heel

According to the CDC, plantar fasciitis affects about 10% of the population, making it the most common cause of heel pain. Runners, military recruits, and people who stand for most of the workday often experience plantar fasciitis. Additionally, young male athletes, middle-aged females, and obese individuals are at risk. The classic telltale sign is pain with the first step of the morning. Then it improves during the day, but often returns by the end of the day. Based on the signs and symptoms and who experiences the heel pain, plantar fasciitis is also called jogger's, tennis, or policeman's heel; heel spur syndrome; and the medical term, calcaneal periostitis is used to describe the chronic condition.

Foot anatomy

A long ligament of 3 bands (medial, central, and lateral), this connective tissue originates at the medial aspect of the calcaneus, or heel bone, and extends all the way across the bottom of the foot to the toes (**Fig.**). Overall, the function of the plantar fascia is to provide tension and support to the arch of the foot as well as aid in shock absorption while walking. The central band is the thickest and strongest part of the plantar fascia and it is the most involved segment in plantar fasciitis.

Signs and symptoms

Patients often experience pain along the inside, or medial side of the heel, which is most severe with the first steps after a period of inactivity. The pain tends to decrease in intensity as the activity level increases throughout the day, but becomes more severe by the end of the day, which explains why active people experience greater pain after exercise rather than during activity. Almost a third of the time, plantar fasciitis affects both feet and it sometimes involves the entire foot including the toes. While the symptoms associated with plantar fasciitis often resolve with a good outcome, it can take 6 to 18 months, and sometimes longer, for patients to experience relief. Thus, seek early diagnosis and treatment for heel pain, especially if you are at risk for plantar fasciitis.

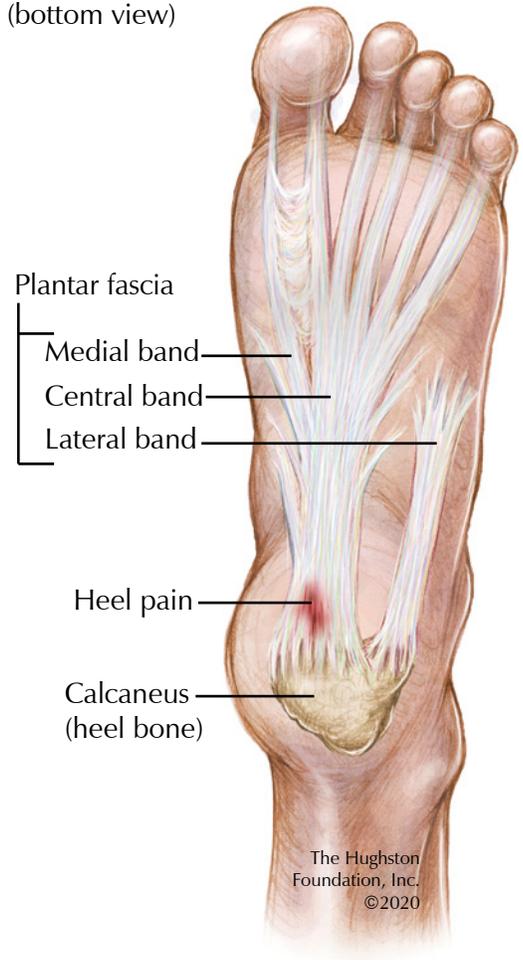
Risk factors

The most common cause of plantar fasciitis is repetitive stressing of the plantar fascia, which results in microtears and a vicious cycle of recurrent inflammation. At one time, physicians thought bone spurs were responsible for the microtears in the ligament; however now, most researchers do not believe that is the case. Many risk factors are associated with developing plantar fasciitis, such as obesity, prolonged standing or inactivity, flatfeet, and poor footwear (**Box**). Consequently, regular exercise, walking, and losing weight can lower your risk or help relieve your symptoms.

Diagnosis

To identify your heel pain, your doctor will perform a thorough physical exam of your foot and ankle. The first physical notation is your arch type, since a high arch is a major risk factor. Your doctor will also press on the plantar fascia while you move your foot to see if you experience more or less pain with movement. For example, your pain

Fig. Foot anatomy (bottom view)



may get worse when you flex your foot while the doctor is pressing the plantar fascia, but it may improve while you point your toes down. Your doctor may also have you stand with your feet flat on the floor and raise your toes to see if it increases or decreases your pain.

Often, your doctor will order x-rays of your foot to rule out a fracture. While laboratory tests are not needed to make a diagnosis of plantar fasciitis, advanced forms of imaging, such as ultrasound or magnetic resonance imaging (MRI, a scan that shows the bones, muscles, tendons, and ligaments) can be used if you do not experience relief after 6 to 8 months of nonsurgical management.

Treatment

Your options include both nonsurgical and surgical interventions, but up to 90% of patients experience relief with nonsurgical modalities. Your doctor can recommend over-the-counter nonsteroidal anti-inflammatory drugs (NSAIDs), such as aspirin and ibuprofen first or you may need a prescription for a

Box. Plantar Fasciitis Risk Factors

Anatomic:

- Obesity
- Pes planus (flatfeet)
- Pes cavus (high-arched feet)
- Leg length discrepancy
- Shortened Achilles tendon
- Poor biomechanics or alignment

Biomechanic:

- Overpronation (inward roll)
- Limited ankle dorsiflexion (difficulty lifting toes up while the heel is on the ground)
- Weak intrinsic muscles of the foot (weak muscles that move toes)
- Weak plantar flexor muscles (muscles on the bottom of the foot)

Environmental:

- Deconditioning
- New or increase in activity
- Hard surface
- Walking barefoot
- Repetitive impact activity, such as running or with sports
- Prolonged weight bearing
- Inadequate stretching
- Poor footwear

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stronger dosage. If pharmacologic therapies do not help improve your symptoms, a corticosteroid injection into the plantar fascia area of the foot may be helpful. Additional modalities include splinting your foot while you sleep, wearing over-the-counter or custom-molded shoe inserts during the day, stabilizing your foot with a cast or walking boot, and completing a physical therapy regimen. Physical therapy options range from at-home exercise routines to formal therapy with modalities that include icing, taping, ultrasound therapy, or deep massage.

If you are among the 10% of patients whose symptoms do not resolve after 6 to 12 months of nonsurgical treatment, then your doctor may suggest a surgical procedure to release the plantar fascia. Overall, the procedure has a 70% to 90% success rate. Complications associated with surgery of the plantar fascia include injury to nerves and blood vessels, instability of the arch of the foot, and overloading of the outside, or lateral aspect of the foot.

A step forward

Plantar fasciitis is a debilitating disease, which can limit your daily functions and activities. The pain caused by plantar fasciitis is often self-limiting, which is why you should seek medical attention early for an appropriate diagnosis and treatment plan. If you are experiencing chronic heel pain, talk to your doctor, getting help is the first step toward a pain-free life.

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Ergonomics in the Workplace

Absenteeism cost employers \$225.8 billion dollars annually in the United States, equaling to approximately \$1,685 per employee according to the CDC Foundation—a nonprofit organization established by Congress to aid the Centers for Disease Control. The Foundation also reports that over the past 10 years, the injury and illness incidence rates have declined from approximately 5 cases per 100 full-time employees to approximately 3 cases per 100 employees for private companies, while the incidence of injury and illness for state and government employees remains slightly higher. Mid-size establishments who employ between 50 and 249 workers have the highest rate of injury or illness cases by establishment size, while small establishments who employ fewer than 11 workers have the lowest rate of injury or illness cases. When looking at the



distribution of nonfatal occupational injury and illness cases by category of illness for private industry employers, nearly 95% of cases are on-the-job injuries, while the other 5% includes illnesses such as respiratory conditions, hearing loss, skin diseases, etc. The financial impact of workplace injury in the US is astonishing to say the least.

Since injuries in the workplace account for the majority of days away from work, ergonomics in the workplace plays a crucial role in promoting safe work practices and healthy work environments. For employers of all sizes, this increases profitability but it also increases employee satisfaction, which results in a higher productivity level and decrease in turnover. Larger companies with larger profits may be able to sustain the financial impacts of a workplace injury; however, an injury within a small company can be devastating.

Ergonomics is an applied science concerned with designing and arranging the tools and workspace people use so that the employee interacts most efficiently and safely within the environment. Ergonomics is not forcing the person to fit the job, but rather trying to eliminate risk factors such as hot or cold environments, awkward positions, vibration, forceful exertions, and repetitive motions to allow employees to work safely and efficiently. Repeated or continual exposure to 1 or more of these factors initially may lead to fatigue and discomfort, but over time, it can lead to acute or chronic injuries.

Improve the fit

Ergonomic improvements are changes made to “improve the fit” between the demands of the task and the capability of the worker. These improvements can be both administrative as well as from an engineering standpoint. Examples of administrative improvements include providing employees with a variety in jobs to eliminate or reduce repetition, adjust work schedules,



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pace, and practices. Employers can also provide recovery time and rotate workers through jobs that use different muscles, body parts, or postures. Administratively, some companies have written policies regarding lifting and what weights or pieces of equipment should be lifted by 1 person and what should be lifted by 2 or more people. Some companies ingeniously tackle this issue with colored stickers that identify how many employees are required to move specific parts or equipment.

From an engineering standpoint, many improvements can be applied in the work place, such as modifying processes and providing or replacing items such as tools and equipment. Engineering can also include rearranging or redesigning equipment, workstations, packaging, parts, products, or materials. Obviously, the financial impact of these engineering issues is something that every company has to determine. Employers base these decisions on the budget, cost, and the amount of risk that the company is comfortable taking.

The industrial athlete

Employees should not be placed in positions that they physically cannot perform because it can lead to failure or injury. This is where the concept of “The Industrial Athlete” comes in. An employee or industrial worker whose occupation involves physical effort is essentially a unique type of athlete. The industrial athlete’s performance has direct implications on the success of the company, similar to the success of an athletic team.

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Following the sports medicine model of prevention, a comprehensive program that includes conditioning, early intervention, and progressive treatment allows the industrial athlete to perform at his or her best in a safe environment. Employers can do a jobsite analysis, which is a tool that allows employers to produce a physical job performance for specific jobs. It identifies the specific physical requirements of a job, such as how many times the employee has to lift from the floor to overhead, and the specific weight requirement.

If the job description includes a physical requirement, then the employer should perform a Post-Offer Screen, or a Physical Ability Screen, which confirms that the employee applying for a particular position can physically perform that job. If the job requires an employee to lift 50 pounds overhead, 5 times a day then you test that specific task. If the employee cannot do the task, he or she is not eligible for the job. If the employer places an employee in a job without testing, the employee is potentially setup for failure or injury. The following example fits right into the industrial athlete metaphor. A football team would not start a 300-pound player at running back because you want a running back that is light, fast, and agile. Your football team makes sure that each player is in a position that he or she is most likely to succeed in while also avoiding injury and that is what an employer should do as well.

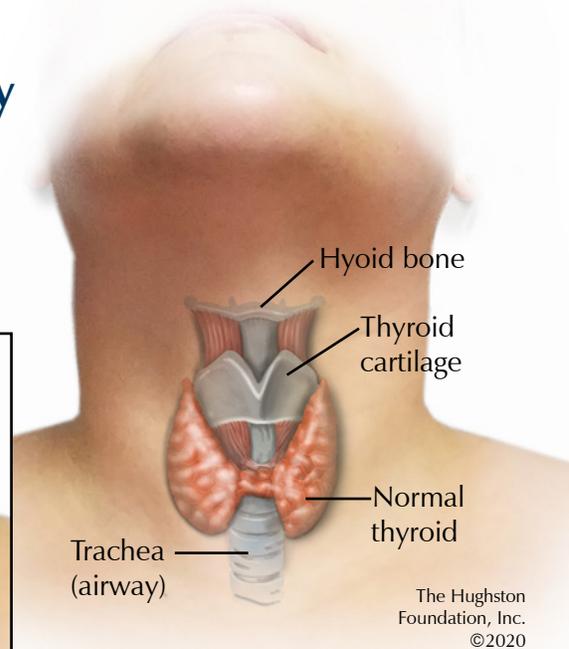
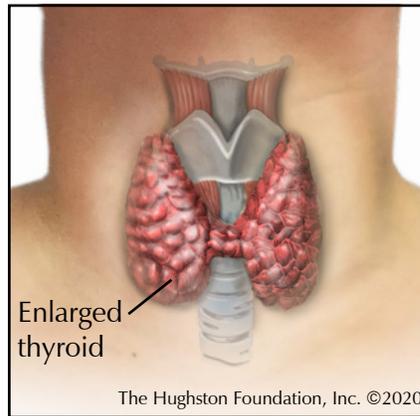
A healthy workforce

Ergonomics is an investment that offers a high-end return for both employer and employee. With a strong ergonomics plan, employers see benefits such as a reduction in medical expenses, decreased turnover, less absenteeism, higher productivity, and improved quality workmanship. For the employee, morale improves because the company shows a commitment to their wellbeing. Most businesses cannot thrive without a healthy workforce and ergonomics is a key component for a successful business.

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When Should I See a Surgeon About My Thyroid?

Fig. Neck anatomy



Thyroid disease comes in many forms, but not all thyroid disease requires surgical attention. If you detect an abnormal lump or swelling in your neck or if you begin to experience symptoms suggestive of an overactive thyroid gland, contact your primary care physician (**Fig**). These symptoms can include intolerance to heat, unexplained weight loss, muscle weakness, tremors, fatigue, skin and hair quality changes, new onset of nervousness, anxiety, or heart palpitations.

There are diseases of thyroid function, which we often describe as either hyperthyroidism (an overactive thyroid gland) or hypothyroidism (an underactive thyroid gland). Then there are diseases that affect the thyroid's physical form, which we often describe as either a goiter (enlarged thyroid gland) or thyroid nodules (abnormal growths within the thyroid gland). Your primary care physician or an endocrinologist can treat hypothyroidism with a once-daily prescription of a synthetic thyroid hormone. However, your doctor may refer you to a head and neck surgeon for your thyroid if you have a goiter, hyperthyroidism, or a thyroid nodule.

What is a goiter?

Physicians use the term goiter to describe an enlargement of the thyroid gland. This enlargement can be the result of multiple causes. The most common cause worldwide is iodine deficiency, which affects roughly 30% of the world's population. However, in the United States, we add iodine to table salt; therefore, an iodine deficient goiter is rarely seen, making most in the US due to other causes. One point that often confuses patients is that goiters are not necessarily associated with abnormalities of thyroid function. A patient can have a very large goiter but at the same time have normal thyroid function. Likewise, a patient may have only a very small goiter but a large degree of hyperthyroidism. Either of these conditions may result in the need for surgical treatment.

Nontoxic goiter or multinodular goiter

A nontoxic goiter is the name given to an enlarged thyroid gland that is not associated with hyperthyroidism. These goiters are often comprised

of multiple abnormal nodules that form within the gland, giving it an abnormally enlarged appearance. For this reason, we refer to these goiters as multinodular. Patients often detect the presence of a multinodular goiter or a physician may make an incidental finding during a routine physical examination or x-ray of the neck. Most patients with multinodular goiters do not experience symptoms; therefore, the concern essentially revolves around any possible presence of cancer and any risk of hyperthyroidism. Your doctor can address these concerns with simple tests, such as biopsies that can rule out the presence of cancer and blood tests that can detect the presence of hyperthyroidism.

With a multinodular goiter, some patients may experience symptoms as a direct result of pressure exerted by the enlarged thyroid gland. These compressive symptoms include difficulty breathing or swallowing, hoarseness, or an uncomfortable sense of pressure in the area of the gland itself. If you experience these symptoms, your doctor will refer you to a head and neck surgeon for surgical removal of the enlarged thyroid gland.

Hyperthyroidism and toxic goiters

For some patients, a toxic goiter that is associated with hyperthyroidism is detected in your blood test. If the test shows hyperthyroidism, your doctor can order a special type of x-ray called a nuclear medicine study. This test can help in determining the exact underlying cause of hyperthyroidism. The most common cause of a toxic goiter is a condition called Graves' disease, which is an autoimmune condition that affects the thyroid gland causing it to become enlarged and overactive.

Multinodular goiters can also be toxic. While hyperthyroidism may be brought under control with medications, the drugs can have unpleasant side effects and are therefore not considered appropriate for long-term or definitive management. Another option for treatment in cases of either Graves' disease or toxic multinodular goiter is radioactive iodine therapy. A radiation oncologist provides this treatment to resolve hyperthyroidism through a nonsurgical modality. Radioiodine therapy does come with its own set of special considerations and potential side effects that can cause it to be a less than satisfactory solution depending on the individual and their medical history. For these reasons, patients with both Graves' disease and toxic multinodular goiters are often referred to a head and neck surgeon for removal of the thyroid gland to resolve the problem. Your doctor will talk with you to help you determine which course of treatment is best for you.

What is a thyroid nodule?

Thyroid nodules are the most common reason why individuals see a head and neck surgeon. An individual may have only a single nodule (often referred to as a solitary nodule) or they may have multiple nodules within

the thyroid gland (often referred to as a multinodular goiter as previously discussed). It is important to understand that nodularity within the thyroid gland is extremely common. Researchers estimate that somewhere between 35 to 50% of individuals have at least one nodule within the thyroid gland. The patient or their health care provider often discovers nodules as a lump or swelling in the lower neck just below the Adam's apple. Increasingly, thyroid nodules are discovered incidentally (meaning by accident) on imaging studies of the neck or chest, cervical spine, or carotid arteries which were originally obtained for evaluation of unrelated conditions. Thyroid nodules can be large enough to produce compressive symptoms and, in rare instances, can be overactive in their production of thyroid hormone. For the most part, however the overriding clinical concern is the potential presence of thyroid cancer.

Fortunately, most thyroid nodules are benign. Physicians estimate that only 5% of all thyroid nodules are cancerous. Age, sex, family history, and a history of head and neck radiation therapy, all affect the prevalence of both benign thyroid nodularity and thyroid cancer. The presence of thyroid nodularity increases with age. In general, a nodule in a patient under the age of 20 is twice as likely to be malignant and a nodule in a patient over the age of 70 has a fourfold increased risk of malignancy. While nodules are more common in women, the risk of malignancy in men is twice as high.

The initial diagnostic approach typically involves obtaining a thyroid ultrasound and thyroid blood tests ordered by either your primary care physician or an endocrinologist. Thyroid ultrasound is an invaluable tool in determining the size and characteristics of a thyroid nodule. While there are some characteristic features, which may appear on sonography that might suggest an increased risk of malignancy, by far the most important predictor is nodule size. In general, any nodule 1 cm or larger will typically require further investigation in the form of a minor outpatient procedure called a fine needle aspiration (FNA) biopsy. If FNA biopsy is either positive or suspicious for the presence of malignancy, your doctor will recommend thyroid surgery.

See your doctor

Your primary care providers can often diagnose disease of the thyroid gland with a physical examination and routine blood test. While the majority of these conditions can be either safely observed or medically managed, there are subsets of thyroid conditions that require surgery for proper management. The key to a good outcome in all instances is maintaining proper follow-up with your primary care doctor for routine examinations and blood testing.

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