INTRODUCTION

The thyroid is a highly vascular, brownish-red gland located anteriorly in the lower neck, extending from the level of the fifth cervical vertebra down to the first thoracic. The gland varies from an H to a U shape and is formed by 2 elongated lateral lobes with superior and inferior poles connected by a median isthmus, with an average height of 12-15 mm, overlying the second to fourth tracheal rings. Occasionally, the isthmus is absent, and the gland exists as 2 distinct lobes. **(Cummings, et al. 1998).**

Thyroid surgery has evolved considerably from the times of Billroth and Kocher due to better understanding of the surgical principles, better equipment and advanced surgical techniques. Kocher, in 1909, pioneered what is today known as the conventional thyroidectomy. It has remained the standard approach to the thyroid gland and is still the most widely used technique world-wide. A recent advance is minimally invasive thyroid surgery. Though the concept of minimal access surgery is not new and it has been practiced in many other surgical specialties for over two decades now . **(Mouret, et al. 1996).**

Thyroidectomy is the removal of all or part of the thyroid gland. Thyroidectomy is used to treat thyroid disorders, such as cancer, noncancerous enlargement of the thyroid (goiter) and overactive thyroid (hyperthyroidism).How much of the thyroid gland is removed during thyroidectomy depends on the reason for surgery. If only a portion is removed (partial thyroidectomy), the thyroid gland may be able to function normally after surgery. If the entire thyroid gland is removed (total thyroidectomy), daily treatment with thyroid hormone is essential to replace the thyroid's natural function . **(Brunicardi, et al. 2010) .**

Minimally invasive video-assisted thyroidectomy (MIVAT) was first introduced and popularised by Miccoli *et al.*in Italy in the late 1990s. It has been extensively used in other parts of the world and appears to be an excellent minimally invasive approach to the thyroid. A small incision (1.5 cm) is made in the cervical skin crease and the operation is completed using a video-endoscope, except for the final delivery of the gland, which is removed through the original neck incision. **(Shimizu , et al. 2002).** The lateral neck **(Inabnet , et al. 2001)** , axillary **(Ikeda , et al. 2002)**, anterior chest **(Takami , et al. 2002)** and breast **(Ohgami , et al. 2000)** approaches have all been described. All these approaches have in common the use of a 50° endoscope. They differ only by the site of placement of the access

cannulas. This technique avoids a visible neck scar, provides excellent cosmetic results and allows early return to work. **(Miccoli , et al. 2004).**

Single-incision laparoscopic surgery has been successfully applied to abdominal general and bariatric procedures with advantages of less morbidity over conventional laparoendoscopic surgery. Minimally invasive and laparoendoscopic procedures have also recently been expanded for thyroid surgery.Trans-areola single-incision endoscopic thyroidectomy (TASIET) is feasible with excellent cosmesis and advantages of minimally access surgery. Ongoing studies with TASIET are in progress to define the optimal indications and patient selection criteria for this new thyroidectomy technique . ***(Youben, et al.*** **2011) .**

Robotic surgical systems are among the most innovative surgical developments and have radically promoted the use of minimally invasive techniques. Robotic technologies using different approaches have also been applied to thyroid surgery. Recently, a novel robotic surgical method was described for thyroid surgery based on a gasless, transaxillary approach (TAA).Robotic thyroidectomy using a gasless TAA is a feasible, safe, and promising surgical alternative for selected patients with low-risk thyroid cancer. **(Kang , et al. 2011) .**

MIVAT is most commonly used for thyroid nodules within specific size limits and for low-stage papillary carcinoma of the thyroid(PCT).**(Lombardi ,et al. 2005).**The following are the most widely accepted criteria:a thyroid nodule size less than or equal to 30 mm in diameter,stage T1 or small T2 PCT,total thyroid volume less than 30 mL , and absence of previous history of thyroiditis or neck radiation.Recent studies have demonstrated that MIVAT can be safely used with patients who have histories of prior thyroiditis, prior MIVAT, and a thyroid volume up to 50 mL.**(Lombardi, et al. 2006)** and

(Ruggieri, et al. 2007).

As MIVAT continues to evolve, the only absolute contraindications to this procedure are thyroid malignancy beyond low-stage papillary carcinoma and preoperative evidence of lymph node metastasis. Nodule diameter above 35 mm and thyroid volume over 30 mL are relative contraindications because some groups have demonstrated questions about safety with larger lesions.**(Ruggieri ,et al. 2007).**Prior conventional thyroidectomy is considered a contraindication by most authors. Some groups consider patients candidates for completion MIVAT if a prior lobectomy was performed via a MIVAT approach.**(Lombardi, et al. 2006).**A

history of prior thyroiditis is considered a relative contraindication because some groups have demonstrated that MIVAT can be safely performed in this population. **(Ruggieri, et al. 2007)**.

The targets of minimally invasive video assisted thyroidectomy (MIVAT) could be summarized by: achievement of the same results as those obtained with traditional surgery, less trauma, better post-operative course, early discharge from hospital and improved cosmetic results. MIVAT can be described as either endoscopic "pure" approach (completely closed approach with or without CO2 insufflation), or "open approach" with central neck mini-incision or "open video-assisted approach". Traditionally, open thyroidectomy requires a 6 to 8 cm, or bigger, transverse wound on the lower neck. The minimally invasive approach wound is much shorter (1.5 cm for small nodules, up to 2-3 cm for the largest ones, in respect of the exclusion criteria) upon the suprasternal notch. Patients also experience much less pain after MIVAT surgery than after conventional thyroidectomy. This is due to less dissection and destruction of tissues. Pathologies treated are mainly nodular goiter; the only kind of thyroid cancer which may be approached with endoscopic surgery is a small differentiated carcinoma without lymph node involvement. The patients were considered eligible for MIVAT on the

basis of some criteria, such as gland volume and the kind of disease. **(Ruggieri, et al. 2005).**

The main disadvantages of MIVAT procedures are the longer duration of surgery, steep learning curve and increased cost of surgery due to equipment usage. The reported rate of important complications (like recurrent laryngeal nerve palsy and hypoparathyroidism) are similar to those seen in after conventional thyroid surgery.Reported rates of recurrent nerve palsy and hypoparathyroidism of 1.3% and 0.3%, respectively, in their report of MIVAT. **(Miccoli *, et al. 2004).***