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Case Report

The surgical and adjuvant therapy options for thyroid malignancies infiltrating great vessels of the neck: A review of the literature

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Appropriate surgical and adjuvant therapies for involvement of great vessels in thyroid malignancies have rarely been reported in literature. In this study, we aim to present our experience and provide a review literature of these devastating tumors that requires multidisciplinary intervention during the whole process of management. Among the 118 patients with thyroid malignancies that were presented to us, there were only 2 patients with infiltration of the internal jugular vein. One of these patients underwent segmental resection of internal jugular vein with total thyroidectomy while the other patient had extensive infiltration of internal jugular vein that an extensive radical metastatic lymph nodes resection was not feasible. A review of the English literature since 1930 revealed an additional 42 cases of internal jugular vein infiltration with or without neck and mediastinal vessel involvements. We have analyzed the surgical and adjuvant therapies that were carried out in all these patients and searched for the parameters including; type of surgical and adjuvant therapies, rate of survival, duration of survival (months), follow-up period and mortality. Twenty six of the 42 patients (62%) underwent internal jugular vein resection along with thyroidectomy; 13 patients (31%), thrombectomy of tumour thrombus and 7 (17%), reconstruction of the vessel after resection; 5 venous and 2 arterial. Survival among patients who did not undergo resection was for a mean period of 3.9 months and following resection was 26 months (range 4 months to 6 years). Aggressive resection may result in long term survival in some of these patients and may prolong life in others. Surgical approach to patients with thyroid malignancies infiltrating the great vessels may involve thrombectomy or may require resection of the vein and occasionally artery with or without reconstruction. Patients who underwent resection and adjuvant therapy were found to have better survival rate.

Key words: Thyroidectomy, internal jugular vein resection, neck vein obstruction, thyroid malignancy, running title- thyroid malignancy infiltrating jugular vein.

INTRODUCTION

Carcinoma of thyroid may characteristically show microscopic evidence of vascular invasion (D'Avanzo et al., 2004; Hyer et al., 2008; Mishra et al., 2001). Massive invasion of tumour into the great veins of neck is extremely rare. Only 42 cases have been documented in the English literature (Hyer et al., 2008; Mishra et al., 2001; Patel et al., 1997; Lalak and Campbell, 1997; Onaran et al., 1998; Muta et al., 1978; Bussani and Silvestri, 1999; Koike et al., 2002; Wiseman et al., 2000; Thomas et al., 1991; Kim et al., 1966; Holt, 1934; Sugimoto et al., 2006; Sirota,1989; Niederle et al., 1990; Perez and Brown, 1984; Thompson et al., 1978; Gross et al., 2004; Takeichi et al., 1984; Panzironi et al., 2003; Alzaraa et al., 2008; Lee et al., 2010; Yamagami et al., 2008; Fotis et al., 2009; Leong et al., 2004; Motohashi et al., 2005; Taib and Hisham, 2007;Sengupta et al., 2001). Management of these patients is challenging as they typically present with advanced and rapidly progressive disease (Hyer et al., 2008; Mishra et al., 2001; Patelet al., 1997; Lee et al., 2010; Sengupta et al., 2001) (Table 1). The reported duration of survival of patients with thyroid cancer invasion of the internal jugular vein (IJV) or other great

Table 1. Literature review since 1930 of neck vein infiltration by thyroid malignancy; clinical feature, management and outcome.

Study	No. of parts	Age (years) range (mean)	Sex (M:F)	Signs of venous obstruction	Diagnosis	Pathology	Ext.	Treatment	Outcome (months)	
									Alive	Dead
									No. (range)	No. (range)
Present study	2	62-83	1:1	No: 2	CT-1, IOP-1	Pap-2	IJV-2	IJVR-1, NAT	2(5-48)	-
Lee et al. (2010)	1	66	0:1	No: 1	US, CT/MRI	Pap-1	IJV-1, BCV/RCA	IJVR -1, ResBRCA, Rec-PTFE, RAIT-1	1(72)	-
Fotis et al. (2009)	1	49	0:1	Yes: 1	IOP	Pap-1	IJV	IJVR -1, Rec-SV-1, RAIT-1	1(24)	-
Hyer et al. (2008)	5	43-81 (62.8)	1:4	Yes: 1, No: 4	CT-2, MRI-2, IOP-1	Pap-2, Fol-2, Hurth-1	IJV-4, SVC-2, BCV-1, Facial/linual-1	IJVR -4, EBRT-5, RAIT-4	1(53) Mean: 28	4(23-66)
Yamagani et al. (2008)	1	74	1:0	No	CT-1, ECHO-1	Ana-1	IJV/BCV, SVC/ ATR	Thromt-1, CPB-1	1(7)	-
Alzarra et al. (2008)	1	78	0:1	No: 1	MRI	Fol-1	IJV	NR, RAI	1(14)	-
Taib and Hisham (2007)	3	45-66 (58)	0:3	Yes: 1, No: 2	CT-3, ECHO-2	FOL-3	IJV-3, SVC-2, BCV-1, ATR-2	IJVR -3, Thromt-3, RAIT-3	2(18)	1(3 weeks)
Sugimoto et al. (2006)	1	61	1:0	Yes: 1	CT, MRI, VENG-1	Pap-1	BCV, SVC, ATR	ResBCV, ResSVC, RecV, Thromt-1	1(12 days)	-
Leong et al. (2004)	1	73	1:0	No: 1	MRI	Insul-1	IJV-1, SVC-1	IJVR -1, RAIT-1, EBRT-1	-	1(30)
Motohashi et al. (2005)	1	64	0:1	Yes: 1	CT-1, MRI-1	Pap-1	IJV/EJV, BCV/SVC	IJVR -1, (IJV/ SBCL), Rec-PTFE, RAIT-1	1(24)	-
Gross et al. (2004)	1	49	1:0	No: 1	USD-1	Ana-1	IJV	IJVR -1, Thromt-1	-	1(24)
Panzironi et al. (2003)	1	68	0:1	No: 1	USD-1	Ana-1	IJV(Bil)	NR, EBRT, Chem	Nrep-1	
Koike et al. (2002)	1	26	0:1	No: 1	IOP	Pap-1	BCV-1, SVC-1	ResBCV, Thromt	1(8)	-
Mishra et al. (2001)	5	30-60 (Mean: 38)	1:4	Yes: 1, No: 4	IOP-2, VENG-1,CT-2	Pap-4, Ana-1	IJV-5,BCV-1,CAR-1	IJVR-4, MND-1, ResCA,Tromt-1, RAIT-2	2(30-58) Average: 32, Nrep-1	2(1-4 days)
Wiseman et al. (2000)	1	84	1:0	No: 1	CT-1	?	IJV/EJV, BCV	NR, RAIT-1	-	1(12)
Bussani and Silvestri (1999)	1	67	0:1	Yes: 1	Autopsy	Fol-1	IJV-1	NR, EBRT-1	1(4)	
Onaran et al. (1998)	3	48-68 (54)	1:2	No: 3	CT-1, US-1, IOP-1	Pap-1, Hurh-2	IJV-3, SVC-1	IJVR-3, SVCR-1, Thromt-1	2(36.5)	1(12)
Patel et al. (1997)	1	79	0:1	Yes: 1	CT-1	Pap-1	IJV/SVC, BCV/PV	IJVR-1, Thromt-1,	1(12 days)	
Lalak and Campbell (1997)	1	68	0:1	No: 1	IOP-1	Fol-1	IJV-1	IJVR-1, Thromt-1, RAIT-1	1(8)	
Thomas et al. (1991)	1	61	1:0	No: 1	CT-1	Unspe	IJV	NR	1(Sudden)	
Niderle et al. (1990)	1	57	1:0	Yes: 1	CT-1, VENGR-1	Fol-1	IJV/BCV,SVC/ATR	Thromt-1	1(13)	
Sirota (1989)	1	61	0:1	Yes: 1	Autopsy	Pap-1	ATR	NR, RAIT-1, EBRT-1	1(8)	
Perez and Brown (1984)	1	48	0:1	No: 1	CT-1, VENGR-1	Fol-1	IJV/BCV, SVC	Thromt-1	1(4)	
Takeichi et al. (1984)	2	62-68	1:1	No: 2	CT-2	Pap-1, Fol-1	IJV-2	IJVR -2, RecV-2, Gortex, Int/ExtJVA,	2(24)	
Thompson et al. (1978)	1	67	0:1	Yes: 1	VENGR-1	Fol-1	IJV/BCV,SVC/ATR	Thromt-1	1(24)	
Muta et al. (1978)	1	37	0:1	No: 1	IOP	Pap-1	BCV	Thromt-1	Nrep-1	
Kim et al. (1966)	1	64	1:0	No: 1	Autopsy	Fol-1	IJV/BCV,SVC/ATR	NR	1(18 days)	
Mencarelli (1934)	1	56	1:0	Yes: 1	Autopsy	Ana-1	IJV/ RV	NR	1(Sudden)	
Holt (1934)	1	72	1:0	Yes: 1	Autopsy	adeno	IJV/BCV, SVC	NR	1(5 days)	

Table 1. Contd.

Wylegschanin (1930)	1	52	0:1	Yes:1	Autopsy	Fol-1	IJV/BCV,SVC/ATR	NR	1(2)	
Total	44	60.4 (26-84)	15:29	Yes: 14 (33%), No: 30 (67%)	CT-19, MRI-7, USD-4, VENG-5, ECHO-3, IOP-10, Autopsy-6	Pap-17, Fol-14, Ana-6, Hurthle-3, Unspec-2		IJVR-26,Thromt-13, NR-10, CAR-2, RecV-5, RecA-2, RAIT-17, EBRT-8, CBP-1,	20(4-72)	21(day 66)
									Nrep-3	

IJV- internal jugular vein, BCV- brachiocephalic vein, RCA-right common carotid artery, SVC-superior vena cava, ATR-atrium, EJV- external jugular vein, IJVR- internal jugular vein resection, ResCA- resection of carotid artery, CBP- cardiopulmonary bypass, NAT-no adjuvant therapy, EBRT- external beam radiotherapy, RAIT- radioactive iodine therapy, NR- not resected, Thromt-thrombectomy, Chem-chemotherapy, RecPTFE-reconstruction with PTFE, MND-modified neck dissection, SVCR-superior venacava reconstruction, USD-ultrasound Doppler, CT-CT scan, VENG- venography, IOP-intraoperative, Pap-papillary carcinoma, Fol-follicular carcinoma, Ana-anaplastic carcinoma, Insul- Insular carcinoma, Nrep-Not reported.

cervical veins varies based on whether they were resection or not. While presenting our experience with two patients, a review of the literature on the clinical features, management and outcome of surgical and adjuvant interventions in patients with thyroid malignancies infiltrating great vessels is provided.

LITERATURE REVIEW

A medline literature search of English language articles was performed using the MeSH term “superior vena cava obstruction” or great vein infiltration or venous occlusion and thyroid neoplasms. Articles before 1980 when the use of MeSH terminology was inconsistent were included if they were detailed in articles uncovered in the search. Review since 1930 revealed 42 cases of thyroid cancer infiltrating the internal jugular vein with or without involvement of other vessels in the neck or in the mediastinum.

CASE REPORT

Case 1

A 64 year old lady presented with 5 months history of enlarging neck swelling. She had no other associated symptoms. Ultrasound examination revealed a nodular mass in the right lobe of the thyroid gland measuring 1 × 1 cm and a large 2 × 3 cm jugulo omohyoid lymph node enlargement on right side. Fine needle aspiration cytology confirmed the nodule to be papillary carcinoma of the thyroid. On exploration of the neck, the lymph node was found to be infiltrating the right internal jugular vein. She underwent a total thyroidectomy and functional block dissection on right side with excision of segment of the involved vein (Figure 1). Postoperative radio-active iodine scan revealed no residual thyroid tissue in neck nor distant metastasis. She was on suppressive doses of thyroxine and a repeated thymoglobulin levels during a follow up visit showed normal results. Five years later, during her routine follow up she was in good health.

Case 2

A 83 year old male patient was referred because of bilateral multiple cervical lymph node enlargement. He had undergone a total thyroidectomy and total dissection of the central lymph nodes with central node clearance six years before this admission in another hospital. Fine needle aspiration cytology of the nodes revealed metastatic papillary carcinoma of thyroid. A contrast CT scan showed a near complete obstruction of the left internal jugular vein due to multiple massively enlarged metastatic cervical lymph nodes (Figures 2 and 3). Resection of the internal jugular vein and dissection with clearance of the lymph nodes was planned. However 2 days later he developed myocardial infarction and the surgical intervention was deferred. Five months later he was alive but in poor cardiac status and was being managed symptomatically.

RESULTS

Including the 2 patients from the present study 29 of these patients were female and 15 were male with mean age being 60.4 years (range 26 to 84 years) (1). About one third of them (14/44 patients) presented with features of neck vein obstruction. The diagnosis of IJV involvement was established preoperatively with the use of CT scan in 19 patients (43%), MRI in 7 patients (16%), venography in 5 patients (11.3%), ultra-sound Doppler in 4 patients (9%) and ECHO in 3 patients (7%) where SVC and atrium was suspected to be involved. In 10 patients (22.7%) the infiltration was detected intraoperatively and was not suspected preoperatively while in 6 patients (13.6%) it was detected at autopsy with 4 of these being reported before 1966. The com-monest thyroid cancer was papillary carcinoma in 17 patients (39.5%) followed by follicular in 14(32.5%), anaplastic in 6 (13.9%) Hurthle cell carcinoma in 3 (6.9%), unspecified in 2 (4.6%) and one patient each with Insular carcinoma and adenocarcinoma. Twenty six of these patients underwent resection of internal jugular vein along with thyroidectomy while in 9 patients no resection was carried out either because the tumour was deemed not resection or the patients was not fit for surgery. Tumour thrombectomy with or without resection of vein was carried out in 13 patients (37.14%). Reconstruction of the vein following resection of vein was carried out in 5 patients using either a saphenous vein graft, Gortex graft

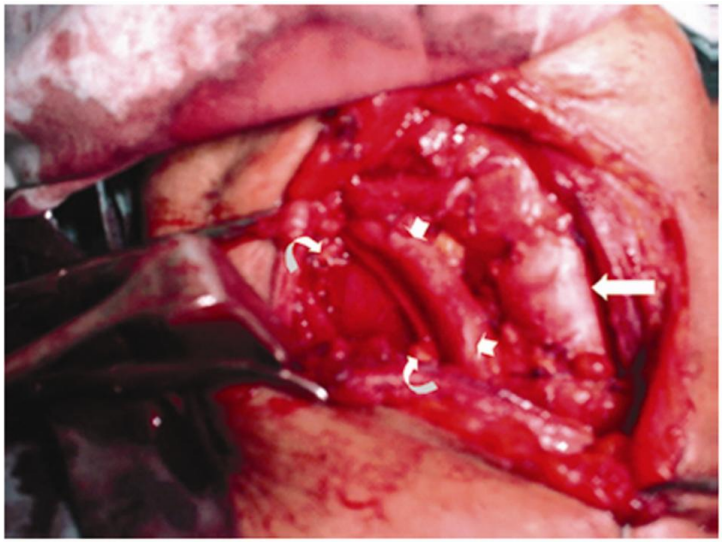

Figure 1. Operative field view of case 1- revealing the exposed trachea (long arrow) after completion of total thyroidectomy and the exposed carotid artery (short arrows) and the cut ends of resected internal jugular vein (curved arrows) following functional block dissection.

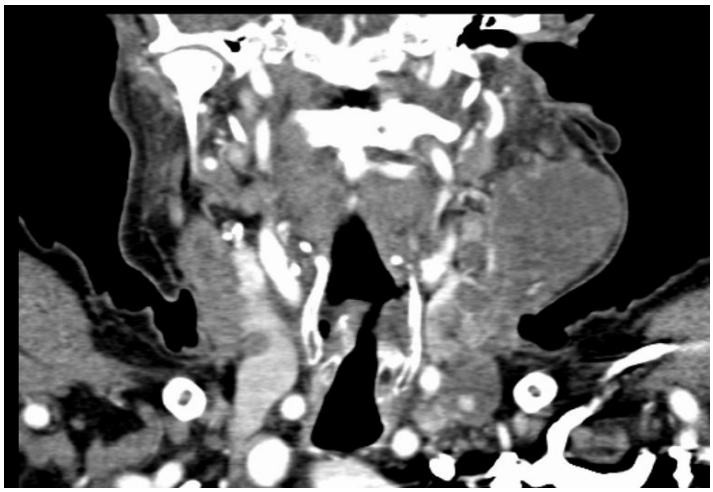

Figure 2. Contrast CT scan of case 2- revealing partial compression of right internal jugular vein and completely obliterated left internal jugular vein by a massively enlarged thyroid carcinoma metastatic lymph node.

or PTFE graft (Onaran et al., 1998; Sugimoto et al., 2006; Panzironi et al., 2003; Leong et al., 2004; Taib and Hisham, 2007). In two patients the reconstruction was carried out with PTFE graft following resection of involved segment of an artery; carotid artery (Mishra et al., 2001) and brachiocephalic artery Lee et al. (2010) in one patient each. Seventeen patients (38.6%) received radioactive iodine therapy following evidence of uptake on radioiodine scan and 8 patients (18.18%) received external beam radiotherapy when the tumour was not resection or had macroscopic residual tissue post surgery (Table 1). Outcome was reported in 39 patients and among these eleven of the patients (25%) who did not undergo resection because of unresectability or being unfit for surgery survived for an mean period of 3.9 months (range sudden death to 420 days) .Among the remaining 33 patients (75%) who underwent resection 20 patients (61%) survived for a mean period of 26 months

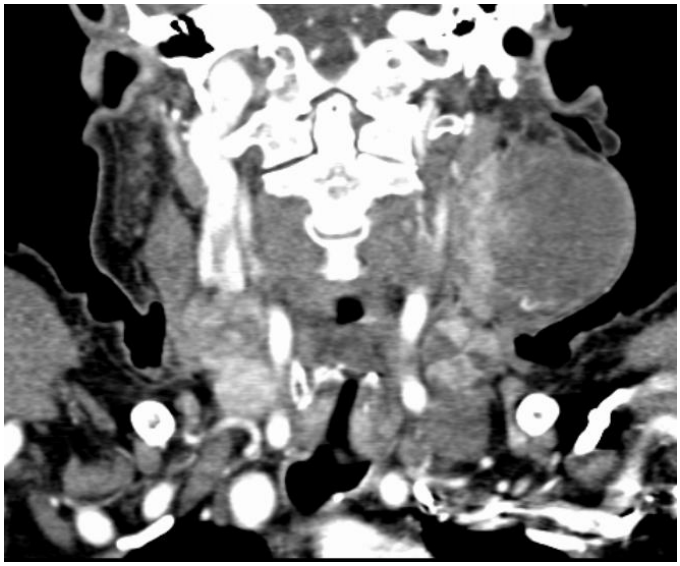

Figure 3. Contrast CT cross section image of case 2 showing a normal right side Internal jugular vein and carotid artery and completely obliterated left internal jugular vein by grossly enlarged metastatic lymph node.

months (range 4 months to 6 years) while the remaining 13 (39%) died after a mean period of 15.4months(range 1day till 66 months).

DISCUSSION

Invasion of the internal jugular vein (IJV) or great veins by thyroid cancer is rare and usually indicates the aggressive nature of the disease and a high probability of mortality (Hyer et al., 2008; Mishra et al., 2001; Patel et al., 1997; Lalak and Campbell, 1997; Onaran et al., 1998; Muta et al., 1978; Bussani and Silvestri, 1999; Koike et al., 2002; Wiseman et al., 2000; Thomas et al., 1991; Kim et al., 1966; Holt, 1934; Sugimoto et al., 2006; Sirota, 1989; Niederle et al., 1990; Perez and Brown, 1984; Thompson et al., 1978). Most of such lesions in the past were detected only at autopsy (Bussani and Silvestri, 1999; Koike et al., 2002; Wiseman et al., 2000; Thomaset al., 1991; Kim et al., 1966; Holt, 1934; Sugimoto et al., 2006; Sirota, 1989). While most common thyroid malignancy to infiltrate IJV is papillary carcinoma (Mishra et al., 2001; Patel et al., 1997; Onaran et al., 1998; Yamagami et al., 2008; Fotis et al., 2009). others to do so are follicular (Hyer et al., 2008; Bussani and Silvestri, 1999; Alzaraa et al., 2008; Taib and Hisham, 2007), and Hurtle cell carcinoma (Hyer et al., 2008; Onaran et al., 1998) (Table 1). They possess angioinvasive features and can spread by direct extension into great vessels (Hyer et al., 2008; Onaran et al., 1998). Most of these patients have huge goiters, enlarged lymph node mass and superior vena cava syndrome (Hyer et al., 2008; Patel et al., 1997; Koike et al., 2002; Chow et al., 2002; Takeichi et al., 1984). The neck vein could be involved by direct infiltration or due to tumour thrombi (Mishra et al., 2001; Sengupta et al., 2001). Tumour thrombus is the result of a tumour extension from thyroid gland through the thyroid veins to IJV. The tumour then propagates in the vein distally with the distal portion often being freely mobile presenting as a leaf like structure (Taib and Hisham, 2007). The endothelium of the great vessels are not invaded possibly because of high velocity flow in these large vessels thus not allowing the tumour to lateralize and infiltrate the endothelium (Taib and Hisham, 2007). The symptoms and signs of tumour thrombus in the IJV and other great veins would depend on the site and the obstruction ratio to the lumen (Gross et al., 2004). Obstruction of internal jugular vein and brachiocephalic vein may give rise to distinct clinical features. The presence of dilated veins on the neck and thorax with increase in collor size, oedema of the trunk and violaceous skin changes is suggestive of obstruction of great veins of the neck and mediastinum and is noticed in about one third of these patients (Hyer et al., 2008; Koike et al., 2002) (Table 1). Additional symptoms could include breathlessness, cough, and symptoms due to cerebral oedema including headache, visual disturbances, proptosis , dizziness and syncope.

The findings in the neck in patients with tumour thrombi in IJV is usually non specific and may reveal oedema and tenderness of the sternomastoid muscle and the surrounding soft tissue (Gross et al., 2004; Takeichi et al., 1984). As the IJV is located deep to sternomastoid muscle a typical palpable cord due to thrombus is not easy to detect (Gross et al., 2004; Takeichi et al., 1984). The concern however is that extension of the thrombi into

the atria may cause sudden death (Sugimoto et al., 2006; Yamagami et al., 2008). When IJV obstruction is found incidentally during routine ultrasonographic evaluation of thyroid enlargement in thyroid carcinoma, infiltration of the IJV by thyroid malignancy should be considered in differential diagnosis (Gross et al., 2004; Panzironi et al., 2003).

This should be differentiated from other possible causes of IJV obstruction including those due to previous IJV catheterization, trauma, radiotherapy, neck surgery and hypercoagulable state (Sengupta et al., 2001). The color doppler sonographic findings of a tumour thrombus is a nonpulsatile distended IJV without doppler signals and without a response to valsalvas maneuver (Panzironi et al., 2003). The thrombus appears as an area of intraluminal echoes (Panzironi et al., 2003; Sengupta et al., 2001). CT may help in the diagnosis as it typically shows a distended IJV with an enhanced wall , a low attenuation intraluminal filling defect and adjacent soft tissue swelling (Thomas et al., 1991). CT scanning and MRI is thus useful in differentiating external compression from intraluminal tumour infiltration (Thomas et al., 1991; Gross et al., 2004; Alzaraa et al., 2008; Sengupta et al., 2001). The presence of ring sign in the great neck vein is where a rim of contrast is demonstrable around the thrombus (Taib and Hisham, 2007). The significance of this sign is that it indicates that the thrombosis is not adherent or invading into the endothelium lining of the great veins thus allowing the thrombus to be removed transcervically by embolectomy (Taib and Hisham, 2007). Spiral CT and the three dimensional reconstruction helps further in evaluation of intravascular tumour thrombus and infiltration. Intrathoracic extension of tumour should raise the suspicion of involvement of the great vessels and should alert the surgeon of the need of cardiothoracic surgeon due the possible requirement of a sternotomy or cadioplulmonary bypass (Hyer et al., 2008). The operability and surgical approach of intravascular extension can be assessed with CT scan. Colour doppler ultrasound and venography may be helpful especially for excluding thrombus in the upper extremities; however the superior vena cava (SVC) may be obscured by osseous structure or lung parenchyma (Koksoy et al., 1995). CT venography has the advantage over digital subtraction venography in its ability to evaluate the extent of obstruction or thrombosis (Thomas et al., 1991). Gallium 67 scintigraphy has been used successfully in diagnosing tumour thrombus in a patient with anaplastic thyroid cancer (Yoshimura et al., 2003). In patients presenting with dysphagia, oesophagoscopy may be required (Hyer et al., 2008). Because of the relatively good prognosis associated with well differentiated thyroid cancer even in advanced disease, complete resection is recommended when feasible to reduce tumour burden (Hyer et al., 2008; Onaran et al., 1998; Taib and Hisham, 2007).

A policy of managing such patients conservatively would result in inadequate treatment in most of them. Most of the authors feel that the presence of massive intravascular invasion should not be a contraindication for resection to palliate impending SVC obstruction (Hyer et al., 2008; Patel et al., 1997; Niederle et al., 1990; Gross et al., 2004; Lee et al., 2010; Yamagami et al., 2008; Fotis et al., 2009; Leong et al., 2004; Taib and Hisham, 2007). Without surgery the prognosis is bleak and death follows from tumour embolism or obstruction of the right atrium (Niederle et al., 1990; Thompson et al., 1978; Lee et al., 2010; Taib and Hisham, 2007).

Management of these patients may involve resection of these veins with or without reconstruction using autologus or synthetic graft (Onaran et al., 1998; Takeichi et al., 1984; Fotis et al., 2009; Motohashi et al., 2005). While unilateral resection of internal jugular vein without reconstruction of the vein may not cause adverse physiological changes, reconstruction after resection is particularly necessary in patients with bilateral involvement of IJV or in those with previous resection of contralateral IJV (Comerota et al., 1986). Reconstruction has been reported to be achieved by interposition of saphenous vein graft Fotis et al. (2009), anastomosis to external jugular vein Takeichi et al. (1984) or by the use of PTFE (polytetrafluroethyelene graft) Motohashi et al., (2005) or Gortex graft (Takeichi et al., 1984). During segmental vein resection the involved vein is ligated before handling to prevent tumour embolisation. When resection is carried out in difficult cases, the concern is to avoid tumour spillage and incomplete resection.

In patients who present with tumour thrombi within the vein, transcervical tumour embolectomy have been successfully performed (Taib and Hisham, 2007). When the tumour is nonadherent as suggested by the positive ring sign in contrast CT scan, transcervical tumour thrombectomy in the great neck veins and right atrium with or without segmental excision of IJV has been reported to be a safe surgical option (Sirota, 1989; Perez and Brown, 1984; Taib and Hisham, 2007). Care is taken to place the patient in Trendlenberg position during the operation to prevent air embolism (Taib and Hisham, 2007).

Occasionally in addition to the involvement of IJV the carotid artery may be involved. The artery could either be encased or infiltrated. When the artery is encased In such patients, successful resection of the tumour has been reported to be achieved by removal of the tumour tissue carefully to skeletonise the carotid artery (Taib and Hisham, 2007). This is feasible as there is often a plane between IJV and the carotid artery as the encasement is predominately due to IJV wrapping itself longitudinally over a firm structure like the artery (Taib and Hisham, 2007). However occasionally it could be direct infiltration needing resection of major arteries with reconstruction using synthetic graft (Lee et al., 2010). However in these patients, reducing ischaemic time is of utmost importance while performing arterial resection and reconstruction

with careful preoperative evaluation the collateral circulation from the circle of Willis is confirmed. When the collateral circulation is inadequate or ischaemic time is expected to be long, bypass grafts and monitoring with cranial doppler ultrasound has been used with success (Lee et al., 2010). The circulation is well compensated by collaterals in patients with long standing venous obstruction and surgery is generally well tolerated (Hyer et al., 2008). Stenting as a palliative therapy can be considered if surgery is not feasible (Lorenzo et al., 2003). However is some of the patients with rapidly progressing compression symptoms , and in those who are not fit for surgery, symptomatic treatment in the form of bed rest ,oxygen and corticosteroids should be offered (Hyer et al., 2008).

Aggressive surgery is acceptable and justified in advanced well differentiated thyroid cancer to decrease the probability of local recurrence and prevent tumour embolism (Hyer et al., 2008; Onaran et al., 1998; Koike et al., 2002; Wiseman et al., 2000; Gross et al., 2004; Alzaraa et al., 2008; Lee et al., 2010; Fotis et al., 2009; Taib and Hisham, 2007). It also provides a better basis for effective radioactive iodine therapy by reducing the tumour mass and hence offer the best hope for prolonged survival D'Avanzo et al., 2004; Hyer et al., 2008; Mishra et al., 2001; Patel et al., 1997; Lalak and Campbell, 1997; Onaran et al., 1998). Although the majority of cases with angioinvasion to the great vessels in the neck and chest by well differentiated thyroid cancer usually carry a poor prognosis, aggressive therapy may at least prolong survival and provide a chance for adjuvant treatment. Therefore angioinvasion is not considered a contraindication to surgical resection (Onaran et al., 1998; Gross et al., 2004; Panzironi et al., 2003; Lee et al., 2010; Fotis et al., 2009; Leong et al., 2004; and Hisham, 2007).

Radical surgical treatment is followed by high dose radioactive iodine with or without external beam radiotherapy (Hyer et al., 2008; Bussani and Silvestri, 1999; Wiseman et al., 2000; Panzironi et al., 2003; Leong et al., 2004). In addition suppression of thyroid stimulating hormone is achieved with thyroxine (Hyer et al., 2008; Alzaraa et al., 2008). This is essential for patients with locally invasive or metastatic thyroid cancer to reduce the risk of recurrence or to retard the progress of the tumour (Hyer et al., 2008; Mishra et al., 2001; Alzaraa et al., 2008; Lee et al., 2010; Leong et al., 2004; Motohashi et al., 2005; Taib and Hisham, 2007). The value of extended beam radiotherapy (EBRT) in management of thyroid cancer remains controversial because published data are conflicting and there are no prospective randomized controlled trials (Hyer et al., 2008). There are reports of EBRT improving local control in patients with gross macroscopic residual disease following surgery (Lorenzo et al., 2003). EBRT is also recommended by some for all patients with known microscopic disease or macroscopic disease following surgery, if older than 45 years, if poorly differentiated and in patients with advanced or recurrent Hurthle cell carcinoma as the tumour takes up iodine infrequently (Hyer et al., 2008; Tsang et al., 1998). The maximum dose of EBRT with accepted toxicity that is recommended is 60 Gy over 6 weeks (Haq and Harmer, 2006). Venous obstruction by thyroid cancer may occasionally respond dramatically to EBRT (Harmer et al., 1998). Following resection routine postoperative radioactive surveillance with radioactive iodine is performed. Yearly scintigraphy and serum thyroglobulin level determination will alert the clinician of possible recurrence (Hyer et al., 2008; Mishra et al., 2001; Onaran et al., 1998; Taib and Hisham, 2007).

Conclusion

Aggressive surgical resection followed by post operative radioactive iodine ablation and thyroxine suppression may result in long term survival in some or prolong life in others with or without residual disease in these otherwise dismal cases. A high index of clinical suspicion is required to diagnose these condition preoperatively and a proper assessment can be achieved by the use of ultrasound doppler, CT, MRI and when required venography or arteriography. Angioinvasion of great vessels is not a contraindication for resection when possible, as it would achieve in relieving the symptoms of venous obstruction and provide chance for adjuvant treatment. Without surgery the outcome is bleak as death is invariable due to tumour embolism, metastasis or sudden death due to obstruction of right atrium.

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