ORIGINAL RESEARCH PAPER

Volume-7 | Issue-6 | June-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

OBJECTIVE FUNCTIONAL SHOULDER OUTCOMES FOLLOWING RADICAL NECK DISSECTION : A PROSPECTIVE DESCRIPTIVE STUDY

ENT

Dr Himanshu Bhayana	Senior resident, Department of Orthopaedics GTB Hospital &UCMS,Delhi, India
Dr Anurgini Gupta*	Senior Resident, Department of ENT, Maulana Azad Medical College and Lok Nayak Hospital; Delhi India *Corresponding Author
Dr Rohit Pandey	Senior resident, Department of Orthopaedics GTB Hospital &UCMS, Delhi, India
Dr P K Rathore	Director Professor and Head, Department of ENT, MAMC and LokNayak Hospital
Dr Harsh Singh	Post Graduate Resident, UPUMS Saifai Etawah, UP, India
Dr Rahul Yogendra Raj	Post Graduate Resident, Department of Orthopaedics, UCMS and GTB Hospital
Dr Suryaprakash D	Senior Resident, Department of ENT, Maulana Azad Medical College and Lok Nayak Hospital; Delhi India

ABSTRACT

Introduction: Radical neck dissection plays a major role in management of cervical metastasis in head and neck oncology. Radical neck dissection causes marked functional shoulder disability due to sacrifice of spinal accessory nerve. Classical neck dissection causes shoulder syndrome in up to 60 % of the cases. To the best of our knowledge, there is no data so far which compares various objective shoulder assessments following the radical neck dissection. Hence this study was conducted.

Material and methods: This prospective descriptive study was conducted from May 2016 to November 2017 in 20 patients with biopsy proven head and neck malignancy. The exclusion criteria were 1: Preoperative chemotherapy or radiotherapy, 2: Recurrent cases 3: History of adhesive capsulitis or trauma or surgical intervention to the shoulder. DASH score, ASES score and SST score were obtained preoperatively and one month following radical neck dissection.

Results: 15 were Male (75%) and 5 were females (25%).The average age of the patients was 59.15 (48-71 yrs) range. The average DASH scores in the post-operative patients was 42.5 and the average ASES score was 47.65. The average SST was 5.45.

Conclusion: Shoulder dysfunction is caused by trapezius deficit due to various degree of dysfunction of spinal accessory nerve. It is regrettable that a procedure designed to save life affects the quality of life as evidenced by postoperative worsening in various shoulder scores. Owing to hampering effects following radical neck dissection has rightfully directed the emergence of nerve sparing procedures such as selective and super selective neck dissection.

KEYWORDS

Introduction

Radical neck dissection was first described by Crile in 1906[1].Radical neck dissection plays a major role in management of cervical metastasis in head and neck oncology. Neck dissections can be classified as radical neck dissection, extended radical neck dissection,modified neck dissection and selective neck dissection[2]

Radical neck dissection causes marked functional shoulder disability due to sacrifice of spinal accessory nerve[3].Szunyogh[4] attributed shoulder disability due to loss of trapezius muscle.Nahum[5]coined shoulder syndrome following radical neck dissection consisting of pain in the shoulder, limitation of abduction, full passive range of motion, with anatomical abnormalities such as drooping of shoulder and electromyographic abnormalities with no radiological abnormalities.

SAN is purely motor nerve providing innervation to Sternoclei domastoid muscle and trapezius muscle. After loss of nerve function, paralysis of both these muscle occurs leading to a complex clinical picture of shoulder syndrome[6]. The nerve passes in inferior oblique direction across posterior triangle of neck to enter the anterior border of trapezius muscle. This is around 3-5 cm above the clavicle.

Classical neck dissection causes shoulder syndrome in up to 60 % of the cases [7]. The remaining 40 % patients are spared due to the fact that trapezius has a dual nerve supply[8,9] and part of this muscle's nerve supply is saved.

Severe upper extremity impairment with functional motor deficit, stiffness of neck and shoulder pain that may radiate to face has been found in 60-80% patients treated with RND [5,7]

Various acceptable and validated shoulder scoring methods have been developed to assess the functional disability of the shoulder like DASH (Disabilities in arm, shoulder and hand), Oxford shoulder score, Constant score, UCLA shoulder score, ASES (American shoulder and elbow society score) and SST (simple shoulder test). This is a prospective descriptivestudy comparing preoperative and postoperative functional scores in patients undergoing radical neck dissection. To the best of our knowledge, there is no data so far which compares various objective shoulder assessments following the radical neck dissection.

Material and Methods

This prospective descriptive study was conducted from May 2016 to November 2017. 20 patients with biopsy proven head and neck malignancy presenting to the department of ENT in Lok Nayak Hospital, Delhi were enrolled for the study. Ethical clearance was taken from the local institutional committee. Both verbal and written consents were obtained from the patients. The exclusion criteria were as follows: 1: Patients receiving preoperative chemotherapy or radiotherapy, 2: Recurrent cases 3: Patients with history of impairment of shoulder function due to adhesive capsulitis or history of trauma or surgical intervention to the shoulder.

DASH score, ASES score and SST score were obtained preoperatively and one month following radical neck dissection. The SST consists of 12 questions with dichotomous (yes/ no) response options. For each question, the patient indicates whether he or she is able or not able to do the activity."Yes" response was given one point and zero score for "No" response. The score ranges from 0 (worst) to 12 (best). DASH and ASES scales are scored between 0 (no disability) to 100.

Results

Of the 20 patients included in the study, 15 were Male (75%) and 5

were females (25%).The average age of the patients was 59.15 (48-71 yrs) range. Dominant extremity was involved in 11 patients and non-dominant in 9 patients.

Patients who had no preoperative disability in shoulder function were included in the study. The DASH and ASES scores were zero in all the patients. The SST score was 12 in all the patients.

The average DASH scores in the post-operative patients was 42.5 (Table 1) and the average ASES score was 47.65 (Table 2). The average SST was 5.45 (Table 3).

Discussion

Ewing in 1952 [10] was first to describe shoulder dysfunction after neck dissection. Shoulder dysfunction is caused by trapezius deficit due to various degree of dysfunction of spinal accessory nerve. Various presenting features could be shoulder droop, scapular dyskinesia, trapezius atrophy, loss of shoulder abduction and shoulder and neckpain.[10-12]. Radical neck dissection (RND) is described for removing neck metastasis[13]. In this procedure, SAN, internal jugular vein and sternocleidomastoid are sacrificed. The spinal accessory nerve is typically described as purely motor nerve supplying to sternocleidomastoid and trapezius. Nahum[5] coined "shoulder syndrome" following radical neck dissection.

Pain is usually localised to the shoulder girdle, radiating into the arm. The pain is due to unsupported shoulder leading to traction on the brachial plexus[14]. Pain scoring was not done in our study. Drooping and decreased abduction is due to sacrificing of the function of trapezius. Trapezius stabilizes and rotates the scapula during shoulder abduction, thus trapezius paralysis hampers shoulder elevation. 16 patients in our study had hampered abduction however 4 patients had normal abduction as well. The reason for maintained abduction is variation in trapezius innervation. Fahreret al[15] and Soo et al [16] reported normal EMG activity in some patients following complete accessory nerve resection. They proposed the motor activity was due to innervation from the cervical plexus.

The spinal accessory nerve is composed of a spinal and a cranial root[17] .The nerve is small being only 2mm in diameter [18], superficial and intimately related to the lymph nodes in level II & V of neck.

The spinal root is the part injured in neck after separating from cranial root, passes backward and laterally anterior to the internal jugular vein in 90 % case and posteriorly in 10 % case.[19]

Brown et al [20] have highlighted the indispensability of trapezius muscle to shoulder girdle stability. They commented that the muscles of shoulder girdle affected by trapezius muscle denervation include supra spinatus, deltoid, infra spinatus, trapezius, serratus anterior and subscapularis. After loss of function of SAN, trapezius muscle paralysis usually results with shoulder dropping and internal rotation of the shoulder.

Loss of function of trapezius is central to the shoulder disability following radical neck dissection. Manning and Stell[21]described that loss of trapezius functioning causes scapula to draw forwards, depressed, and more inferior. This leads to loss of abduction and forward flexion at the shoulder joint.

Giordano et al [22]did a prospective study in 17 patients of laryngeal cancer in whom selective and super selective neck dissection was performed. Abduction, neck dissection quality of life scoring and electromyography recordings of trapezius were compared preoperatively and at follow up. Kuntz et al [13]studied shoulder function in different types of neck dissections (MRND,RND and SND). They did subjective comparison by questionnaires to differentiate how the three forms of neck dissection affect quality of life differently. They reported greater shoulder disability in MRND group at 6 months compared to the SND group, but by 12months there was no difference between the two groups.

Conclusion

Sacrificing spinal accessory nerve during radical neck dissection leads to loss of function of shoulder due loss of trapezius muscle action. Although the loss is common in all the patients, however the functional results are variable. The variable results are best explained by normal anatomical variations. It is indeed regrettable that a surgical procedure designed to save life affects the quality of life as evidenced by postoperative worsening in various shoulder scores. Owing to hampering effects following radical neck dissection has rightfully directed the emergence of nerve sparing procedures such as selective and super selective neck dissection.

Table1: DASH score of the patients

Patient serial number	Preoperative DASH Score	Postoperative DASH score
1	0	40
2	0	43
3	0	46
4	0	41
5	0	47
6	0	37
7	0	39
8	0	42
9	0	40
10	0	45
11	0	36
12	0	49
13	0	43
14	0	50
15	0	42
16	0	46
17	0	45
18	0	39
19	0	42
20	0	38

Table 2: ASES score of the patients

Patient serial number	Preoperative ASES score	Post operative ASES score
1	0	45
2	0	50
3	0	55
4	0	60
5	0	41
6	0	46
7	0	45
8	0	47
9	0	50
10	0	52
11	0	46
12	0	43
13	0	48
14	0	46
15	0	50
16	0	43
17	0	46
18	0	42
19	0	54
20	0	44

Table3: SST score of patients

Patient serial number	Preoperative SST	Postoperative SST
1	12	5
2	12	6
3	12	6
4	12	4
5	12	5
6	12	5
7	12	7
8	12	6
9	12	6
10	12	5
11	12	4

12	12	7
13	12	8
14	12	5
15	12	6
16	12	4
17	12	5
18	12	6
19	12	4
20	12	5

References

1. Crile G. Landmark article Dec 1, 1906: Excision of cancer of the head and neck. With special reference to the plan of dissection based on one hundred and thirty-two operations. By George Crile. JAMA. 1987 Dec 11; 258(22):3286-93.
2. Robbins KT, Clayman G, Levine PA, Medina J, Sessions R, Shaha A, Som P, WolfGT; American Head and Neck Society; American Academy of Otolaryngology--Head and Neck Surgery. Neck dissection classification update: revisions proposed by theAmerican Head and Neck Society and the American Academy of Otolaryngology-Headand Neck Surgery. Arch Otolaryngol Head Neck Surg. 2002 Jul;128(7):751-8.
3. MARTIN H, DEL VALLE B, EHRLICH H, CAHAN WG. Neck dissection. Cancer. 1951May;4(3):441-99.
4. SZUNYOGH B. (1959) Shoulder disability followingradical neck dissection. Am. Surg. 25, 194-198.
5. NAHUM AM, MULLALLY W, MARMOR L. A syndrome resulting from radical neck dissection. Arch Otolaryngol. 1961 Oct; 74:424-8.
6. Cappiello J, Piazza C, Nicolai P. The spinal accessory nerve in head and neck surgery. CurrOpinOtolaryngol Head Neck Surg. 2007 Apr; 15(2):107-11.
7. LEIPZIG B., SUENJ.Y. ENGLISH J.L. BARNES J. &HOOPERH. (1983) Functional evaluation of thespinal accessory nerve after neck dissection. Am. J .Surg. 146, 526-530.
8. Jones TA, Stell PM. The preservation of shoulder function after radical neck dissection. ClinOtolaryngol Allied Sci. 1985 Apr; 10(2):89-92.
9. WEITZ J.W., WEITZ S.L. & MC~LHINNEY. (1983) atechnique for preservation of spinal accessorynerve function in radical neck dissection. HeadNeck Surg. 5, 75-78.
10. Ewing Mr, Martin h. Disability following radical neck dissection; an assessment based on the postoperative evaluation of 100 patients. Cancer 1952; 5:873-83.
11. Cheng A, Schmidt Bl. Management of the N0 neck in oralsquamous cell carcinoma. OralMaxillofacSurgClin northAm 2008; 20:477-97.
12. Bradley PJ, Ferlito A, Silver CE, et al. Neck treatmentand shoulder morbidity: still a challenge. Head neck2011; 33:1060-7.
13. Kuntz AL, Weymuller EA Jr. Impact of neck dissection on quality of life. Laryngoscope. 1999 Aug; 109(8):1334-8.
14. Noren A. Peripheral injuries to the spinal accessory nerve.ActaChirScand 1946; 94: 515-32.15.Fahrer H, Ludin HP, Mumenthaler M, Neiger M. The innervation of the trapezius muscle. An electrophysiological study. J Neurol 1974; 207: 183-8.
16. Soo K, Guiloff, Oh A, QuercidellaRovere G, WestburyG. Innervation of the trapezius muscle. A study in patients undergoing neck dissections. Head Neck Surg 1990; 12: 488-95.
17. Williams PL, Warwick R, Dyson M, Bannister LH, eds.Gray's Anatomy, 37th Edition. Harlow: Longman, 1989:1118.
18. Alnot JY, Oberlin C. Les nerfs utilisables pour uneneurotisation. Anatomiechirurgicale du nerf spinal. In:Alnot JY, Narakas A, eds. Les Paralysies du PlexusBrachial, 2nd Edition. Expansion cientifiqueFrancaise, 1995: 33-8.
19. Caliot P, Bousquet V, Midi D, Cabanie P. A contribution tothe study of the accessory nerve. Surgical implications. SurgRadiolAnat 1989; 11: 11-15.
20. Brown H, Burns S, Kaiser CW. The spinal accessory nerve plexus, the trapezius muscle, and shoulder stabilization after radical neck cancer surgery. Ann Surg.1988 Nov; 208(5):654-61.
21. M. ManningP. M. Steel Clin. Otolaryngol. 1989, 14, 381-384 EDITORIAL The shoulder after radical neck dissection.
22. L. GIORDANO, D. SARANDRIA, B. FABIANO, U. DEL CARRO*, M.BUSSI Shoulder function after selective and superselectiveneck dissections: clinical and functional outcomesACTAOtorhinolaryngologicaitalica 2012; 32:376-379.