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Evaluation of Intercostobrachial Nerve Preservation in Modified Radical Mastectomy for Breast Cancer

—Preliminary Report on Sensory Disturbance Test Results—*)

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ABSTRACT

Among the cases of modified radical mastectomy (Auchincloss' operation) performed at out department, postoperative sensory disturbance of the upper arm was examined in 18 intercostobrachial nerve preserved cases (preserved group) and 18 non-preserved cases (non-preserved group).

The following two differences were noted between the two group. First, whereas the non-preserved group showed the sensory disturbance bilaterally on the medial and posterior aspects of the upper arm, the sensory disturbance in the preserved group was often unilateral and sensory was maintained on the medial aspect at a high incidence. Secondly, whereas the range of sensory disturbnce diminished with time in the preserved group, no such tendency was found in the non-preserved group. This particular nerve is subjected to a varying degree of damage by retraction, etc. in axillary dissection and, thus, undergoes transient paresthesia. However, subsequently there occurs a gradual recovery of nerve function. In the rate of this recovery, the medial branch of the nerve appears to be higher then the posterior branch. In any event, the results suggested that a thorough anatomical knowledge and a conservative surgical procedure are essential to mastectomy with intercostobrachial nerve preservation.

INTRODUCTION

Intercostobrachial nerve is the lateral cutaneous branch of second thoracic nerve (occasionally, third thoracic nerve), perforatin the intercostal muscle and serratus anterior muscle along axillary line.

It runs through the axillary fat pad into the upper arm and, forming a loop with the filaments of medial brachial cutaneous nerve, innervates the skin in the medial and posterior aspects of the upper arm[4].

This nerve is usually dividing in mastectomy and formerly attracted little attention of surgeons. Therefore, there is only a surprisingly scanty amount of literature on the influence of division of this nerve in mastectomy[3,6]. Assa[2] in 1974 and Teicher[5] in 1982 reported the preservation of intercostobrachial nerve in mastectomy but a detailed analysis of this subject matter has never been made, clinically and anatomically.

Recently we hàve been making it a rule to preserve this nerve (Auchincloss' operation) in cases of breast cancer for which modified radical mastectomy is indicated and have accumulated some interesting data. The following is a preliminary report on these cases.

MATERIAL AND METHOD

In 18 intercostobrachial nerve preserved cases and 18 non-preserved cases of modified radical

*) 西亀正之, 山根 基, 天野国幹, 奥道恒夫, 片岡 健, 江崎治夫：乳癌手術（非定型乳房切断術）における肋間上腕神経温存の臨床評価

mastectomy, mainly the sensory disturbance of the upper arm was evaluated by the coolness test.

The time interval between the operation and coolness test was 8.6±3.9 months on the average (2 to 15 months) in preserved cases and 25.6±12.1 months on the average (6 to 45 months) in non-preserved cases. The range of sensory disturbance was expressed in the distance from the axilla to the peripheral end of the region of paralysis. Thus, for each of the medial and posterior aspects of the upper arm, the length of sensory disturbance from axilla/length from axilla to elbow (×100) was caluculated and expressed in the unit of sensory disturbance indices.

RESULT

Table 1 shows the incidence of the sensory disturbance of the axillae and upper arm in the intercostobrachial nerve preserved group and non-preserved group.

The sensory disturbance of the upper arm is found in various ranges distally from axillae towards elbow. The incidence of sensory disturbance of the upper arm was 83.3% (15/18)

Table 1. Incidence of Sunsory Disturbance in wound, axillae & upper arm

Group	total patients	Patients with sensory disturbance	
		axillae	upper arm
IB (+)*	18	18	15
IB (−)**	18	15	14

* IB (+): Intercostobrachial never preserved cases
** IB (−): Intercostobrachial never non-preserved cases

Table 2. Sensory disturbance on medial & posterior aspect of upper arm between Intercostobrachial never preserved and non-preserved groups

Group	Total patients	Patients with sensory disturbance	
		medial*	posterior**
IB (+)	18	10	14
IB (−)	18	14	13

* medial: medial aspect of upper arm
** posterior: posterior aspect of upper arm

in the preserved group and 77.8% (14/18) in the non-preserved group. Thus, there was no significant intergroup difference.

Table 2 shows the incidence of sensory disturbance of the upper arm in the both groups. The incidence of sensory disturbance in medial aspect in the preserved group was 55.6% (10/18) and though this figure is slightly lower than 77.8% (14/18) for the non-preserved group, the difference is not statistically significant.

Table 3 shows the combination of presence/absence of sensory disturbance in the medial and posterior aspects of the upper arm and the incidences thereof in the both groups. The incidence of sensory disturbance involving both medial posterior aspects was 50% (9/18) in the preserved group and 72.2% (13/18) in the non-preserved group. Thus, there was no significant difference. In regard to the incidence of cases in which sensory disturbance did not appear at all, there was no difference, either, between the both group, i.e. 16.6% (3/18) in the preserved group versus 22.2% (4/18) in the non-preserved group. However, the incidence of caees in which sensory disturbance did not appear in medial aspect but did appear in posterior aspect

Table 3. Sensory disturbance on upper arm in Intercostobrachial nerve preserved & non-preserved cases: Analysis of laterality of sensory disturbance

Laterality of sensory disturbance	IB (+) group		IB (+) group	
	Number	%	Number	%
Bilateral	9	50.0	13	72.2
Medial aspect only	1	5.6	1	5.6
Posterior aspect only	5	27.8*	0	0*
None	3	16.6	4	22.2
Total	18		18	

* Significant difference ($p<0.1$, Chi-square Yetes' test)

was 27.8%* (5/18) in the preserved group and 0%* (0/18) in the non-preserved group. Thus, this incidence was significantly higher in the preserved group than non-preserved group (*$p<0.1$, $x^2=3.71$, Yetes' correction).

This means that the preservation of intercostobrachial nerve resulted in a high rate of preservation of sensation in medial aspect (Table 3).

Fig. 1 is a graph, for the preserved group, showing the period in months from operation till sensory test on the ordinate and the combined index of sensory disturbance in the medial and posterior aspects of the upper arm on the abscissa. In this graph, the high damage group with bilateral damage in medial and posterior aspects is clearly demarcated from the low damage group with almost unilateral damage. Excluding 3 cases without sensory disturbance, the correlation coefficients (r) for each group were calculated. Both the high damage group with $r=-0.892$ ($n=6$, $p<0.02$) and the low damage group with $r=-0.708$ ($n=9$, $p<0.05$) showed significant negative correlation. While Fig. 2 shows a similar set of figures for the non-preserved group, no significant correlation was found in the present study.

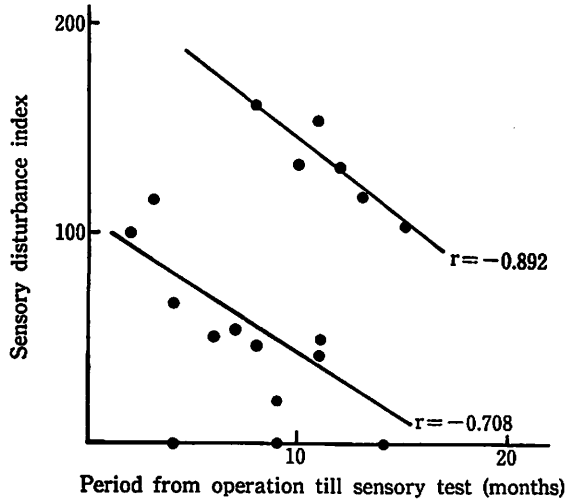

Fig. 1. Relationship between Sensory Disturbance Index and Period from operation till Sesory Test in Intercostobrachial nerve preserved group.

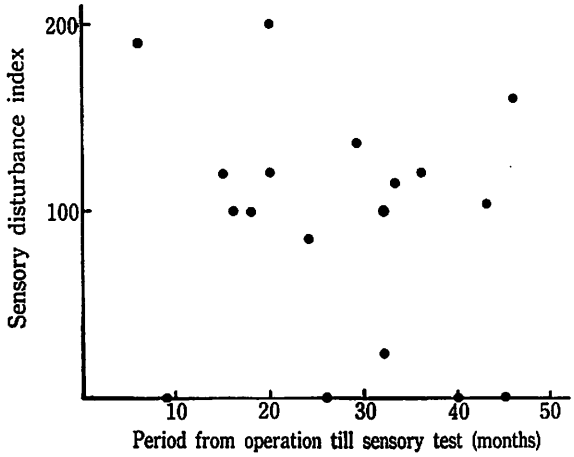

Fig. 2. Relationship between Sensory Disturbance Index and Period from operation till Sensory Test in Intercostobrachial nerve non-preserved group.

DISCUSSION

In 1978 Wood[6] reported 5 cases in which severe pain had developed in the upper arm after mastectomy and termed the condition "intercostobrachial nerve entrapment syndrome". Budd[3] descrived as the term "intercost brachial neuropathy" for exaggerated hyperesthesia after mastectomy and reported that its incidence was 4.1% (6/107). In the present study at our department, no case had severe pain in the region innervated by intercostobrachial nerve but only 3 of 33 cases complained of mild pain.

Teicher et al.[5] who preserved intercostobrachial nerve in 30 cases of mastectomy reported that after 1 postoperative week, no case has sensory disturbance in the upper arm. Though there might be a difference in never preservation technique or in definition of sensory disturbance between them and us, the results for our 18 cases of intercostobrachial nerve preservation and as old as 2 months after operation showed that the range of sensory disturbance had clearly improved with an increasing the period from operation to examination. Besides, the incidence of sensory disturbance in our cases was higher (83.3%) than in non-preserved group (Fig. 1, Table 1).

In the present study, no adequate case control was made between intercostobrachial nerve preserved group during the time period from operation to sensory test, a simple comparison of the two groups may not have complete varidity. However a couple of interesting differences were observed between the preserved and non-preserved groups. Firstly, whereas the sensory disturbance appeared almost symmetrically in both the medial and posterior aspects of the upper arm in the non-preserved group, there was not symmetry in the preserved group. In

the preserved group, many cases appeared sensory disturbance in posterior aspect and none in medial aspect (Table 3). Secondly, whereas the range of sensory disturbance was improving with an increasing the period from operation to examination in the preserved group, no each tendency was found in the non-preserved group. The reasons for the first point appear to be as follows. (1) The intercostal nerve is more or less damaged by retraction, etc. in axillary dissection so as to cause transient paresthesia in the upper arm, which, however, shows a gradual recovery with time. In this stage, the branch of this nerve in medial aspect may have a greater tendency of recovery than the branch in posterior aspect. (2) Since the branch in posterior aspect may be early originating from the main trunk and small in diameter, they may be liable to be divided during operation. In any event, for the preservation of intercostobrachial nerve, a thorough anatomical knowledge and a conservative and careful surgical procedure seem to be essential.

Aitken[1] warns that while the preservation of intercostobrachial nerve may reduce the incidence of postoperative paresthesia, he will afraid of the risk of insufficient dissection of axillae.

In our experiences from the aspect of technique, axillary dissection is possible without injury the intercostobrachial nerve. As a rule, we preserve the intercostobrachial nerve as possible as to prevent the postoperative discomfortable complication. But invasive finding to this nerve or many lymph node metastasis to the axilla were found by the frozen section during operation, we will change the operative method from modified to radical mastectomy. We are contemplating to generate additionl data on modified mastectomy with intercostobrachial nerve preservation with due attention to strict case selection and precise follow-up.

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