

# The Importance of Interpectoral Nodes in Breast Cancer

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**In a consecutive series of 73 patients undergoing a level III axillary clearance, interpectoral nodes were sought and, if palpable, excised. 18 interpectoral nodes were identified in 15 patients, 10 (14%) of whom had involved and 5 of whom had uninvolved interpectoral nodes. 7 of the 10 patients with involved interpectoral nodes also had axillary node involvement, but 3 patients had positive interpectoral nodes in the absence of involved axillary nodes. A comparison of patient and tumour characteristics in the groups of patients with and without interpectoral node involvement showed that patients who had involved interpectoral nodes were significantly younger and had significantly larger tumours. Interpectoral node involvement by breast cancer is not uncommon and these nodes can be involved in the absence of axillary nodal involvement. They should be looked for, and if identified, excised during axillary clearance.**

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## INTRODUCTION

In 1896 Grossman [1] was the first to report the presence of lymphatic trunks and interspersed lymph nodes between the pectoralis major and pectoralis minor muscles. However, this group of nodes are frequently known as Rotter's nodes after the author of a description published 3 years later in 1889 [2]. Whereas Rotter identified two or three interpectoral nodes in approximately half of the surgical specimens that he studied and Haagensen reported an average of 1.8 interpectoral nodes in a series of radical mastectomy specimens [3], Rehman and Hiatt could identify nodes in the interpectoral region in only two out of 3000 dissections in cadavers [4]. Interpectoral nodes may be involved in up to 10% of patients with breast cancer [3, 5] and in Haagensen's series, 3 of 196 patients had interpectoral node metastases in the absence of involvement of axillary and internal mammary nodes [3].

More recently, in many centres, interpectoral nodes have not been routinely sought and have not been removed as part of total mastectomy and axillary node clearance [6]. As adjuvant therapy is now based on lymph node status, it can be argued that it is important to know if there are significant numbers of patients who are axillary node-negative but have involved interpectoral nodes and who, therefore, might benefit from appropriate adjuvant therapy. The aim of the present study was to assess the frequency and pattern of interpectoral node involvement in a series of patients undergoing total mastectomy or wide local excision combined with full axillary node clearance as primary treatment for operable breast cancer.

## PATIENTS AND METHODS

A consecutive series of 73 patients who were undergoing level III axillary clearance combined with wide local excision ( $n = 22$ ) or total mastectomy ( $n = 51$ ) performed as definitive treatment for operable breast cancer ( $T_1$ ,  $T_2$ ,  $T_3$ ,  $N_0$ ,  $N_1$ ,  $M_0$ ) were studied

during a 4-month period. This represented 73% of all patients with operable breast cancer undergoing surgery at this time. The remaining 28 patients underwent wide local excision and axillary node sample as part of a randomised study comparing the morbidity of axillary node sample and axillary node clearance. Patients were selected for wide local excision if their tumour was less than 4 cm in size, single and not associated with any mammographic evidence of multifocality or multicentricity. Mastectomy was performed if any of the following were found: the breast cancer measured over 4 cm in size; if, on wide local excision, the pathologist reported that two or more resection margins were involved or that extensive *in situ* disease was identified in association with the invasive cancer; if there was mammographic evidence of multifocal disease; if the patient was elderly and had relapsed on tamoxifen but the patient was deemed fit for mastectomy; or if the patient selected mastectomy in preference to wide local excision. The age of the patients varied from 23 to 94 years and tumour size varied from 1 to 8.5 cm on clinical examination and from 0.4 to 6.8 cm on pathological assessment. The operation was performed either by a consultant surgeon ( $n = 62$ ) or a senior registrar ( $n = 11$ ).

Mastectomy was performed through an elliptical incision incorporating skin wide of the tumour and the nipple. All axillary clearances in association with wide local excisions were done through a separate 'lazy S' incision placed in the skin crease lines of the axilla. During axillary clearance, the pectoralis minor muscle was divided and tissue below the axillary vein excised up to the apex of the axilla, always preserving the long thoracic nerve and the thoracodorsal nerve and vessels. The investing fascia on the deep surface of the pectoralis major was then divided and dissection around the pectoral branches of the thoracoacromial vessels performed. Any tissue in this region which the surgeon considered could include interpectoral nodes was removed, labelled and submitted for pathology. Routine fat clearance of specimens was not utilised, but all nodes identified were examined histologically at three separate levels.

Details of clinical and pathological tumour size, site of the tumour and extent of axillary nodal involvement were recorded. The association between interpectoral node involvement and tumour site, tumour size and extent of axillary node involvement was assessed statistically using  $\chi^2$  and Wilcoxon–Rank sum tests.

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Table 1. Involvement of axillary and interpectoral nodes in 73 patients with breast cancer

Interpectoral node status	Axillary node status	
	Positive (n = 37)	Negative (n = 36)
Positive n = 10	7	3
Negative* n = 63	30	33

\*Patients classified as having uninvolved interpectoral nodes include patients in whom no interpectoral nodes were identified.

## RESULTS

18 interpectoral nodes were identified in 15 patients (20%); 10 patients had involved interpectoral nodes (14%) and 5 had uninvolved interpectoral nodes. The number of axillary nodes in axillary clearance specimens ranged from 8 to 32 with a median of 21 nodes. 37 of the 73 patients had involved axillary nodes (51%). The association between metastatic involvement of the axillary and interpectoral nodes is shown in Table 1. 7 of the 37 patients who had involved axillary nodes had involved interpectoral nodes (19%) and 3 patients had involved interpectoral nodes in the absence of axillary node involvement. Details of patients with either involved interpectoral nodes or uninvolved or undetected interpectoral nodes are presented in Table 2. Patients with involved interpectoral nodes were significantly

younger than those without interpectoral involvement. Although there was no statistical difference between tumour location in the two groups, all patients with involved interpectoral nodes had tumours involving the upper half of the breast. Carcinomas in patients with involved interpectoral nodes were significantly larger than those in patients whose interpectoral nodes were either not involved or not detected (Fig. 1). There were 37 patients who had involved axillary nodes and patients appeared more likely to have extensive nodal involvement if they also had interpectoral node involvement, although the difference between the groups did not quite reach statistical significance (Table 2).

Of the 40 patients who were identified as node positive, 3 (75%) had only interpectoral nodes involved. 2 of these patients were young (aged 24 and 45) and premenopausal and the other was a 58-year-old postmenopausal patient. At a median follow-up of 12 months, 2 of these 3 patients had developed systemic metastases and 1 had died.

## DISCUSSION

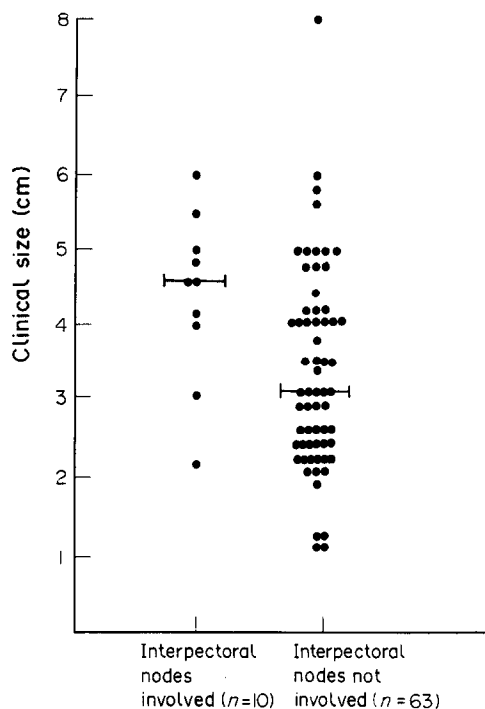
Nodes deep to the fascia of the pectoralis major around the pectoral branches of the thoracoacromial vessels were identified in 20% of patients in the current study. Their position on the deep aspect of this muscle may explain why Rehman and Hiatt were unable to identify them in their dissection of cadavers. From diagrams in their publications it appears that interpectoral nodes are situated on the anterior surface of the pectoralis minor muscle [4], which is clearly incorrect. Another possible

Table 2. Clinical and pathological data on groups of patients separated according to interpectoral node (IPN) status (IPN positive, involved interpectoral nodes; IPN negative, uninvolved or undetected interpectoral nodes)

		Interpectoral node		Total	P value*
		Positive	Negative		
No. of patients		10	63	73	
Age (years)	Mean	42.7	57.6	55.5	$P < 0.01$
	Median	55	59	57	
	Range	23-61	39-92	23-92	
Site of tumour	UOQ	7	41	48	NS
	UIQ	2	9	11	
	Central	1	4	5	
	LOQ	0	7	7	
	LIQ	0	2	2	
Surgery	WLE	3	19	22	NS
	Mastectomy	7	44	51	
Pathology tumour size (cm)	Mean	4.1	4.1	4.1	$P < 0.02$
	Median	4.5	3.0	4.0	
	Range	2.2-6.0	1.0-8.0	1.0-6.0	
	No. of patients with involved nodes	7	30	37	
Pathological axillary node status					
	Mean no. of nodes involved	9.3	4.0	5.0	$P = 0.06$
	Median no. of nodes involved	12	3	5	
	Median no. of nodes excised	19	20	20	
	Range	8-32	7-35	7-35	

UOQ = Upper outer quadrant; UIQ = Upper inner quadrant; LOQ = Lower outer quadrant; LIQ = Lower inner quadrant; WLE = Wide local excision; NS = not significant.

\*P value interpectoral node-positive vs. interpectoral node-negative patients.



**Fig. 1. Tumour size related to interpectoral node involvement.** Patients classified as having uninvolved interpectoral nodes include patients in whom no interpectoral nodes were identified.

explanation for why they were unable to identify interpectoral nodes is, as noted by Haagensen [3], that some involved and most uninvolved interpectoral nodes are impalpable. In our small selected series of patients undergoing axillary clearance, 14% of patients had involvement of interpectoral nodes by metastatic breast cancer, a figure slightly higher than that reported by others [3, 5, 8, 9]. The incidence of interpectoral node involvement in the current series may be explained by a bias towards larger tumours in patients in our unit undergoing axillary node clearance. The importance of this bias is demonstrated by the finding in the present study that patients with interpectoral node involvement had significantly bigger tumours than patients whose interpectoral nodes were either not detected or were free of disease. Rotter suggested that interpectoral nodes drained the deep part of the upper portion of the breast [1]. In keeping with this, all patients in the current study with involved interpectoral nodes had tumours involving the upper half of the breast. This has been reported in some but not all other studies of interpectoral nodes [2, 5, 8, 9].

Axillary recurrence after level III axillary clearance is not common, but does occur [7]. One reason that might explain its occurrence is failure to remove interpectoral nodes as part of routine axillary dissection [6]. It is well known that not all involved nodes become symptomatic [7] and the majority of patients who have involved interpectoral nodes also have involved axillary nodes and will receive some form of adjuvant systemic therapy. These two factors could explain the discrepancy between the rate of axillary recurrence and the rate of interpectoral node involvement.

There is clear evidence that premenopausal node-positive patients benefit from adjuvant chemotherapy or oophorectomy [10]. Identification of those patients with involved nodes may, therefore, be of importance when selecting patients for appropriate adjuvant treatment. In the current study, 7.5% of patients with involved nodes in the axillary region had only involved interpectoral nodes and the two premenopausal women with involved interpectoral nodes and negative axillary nodes would have been denied possibly beneficial adjuvant treatment had they not had their interpectoral nodes excised. It is also of interest that patients with involved interpectoral nodes were significantly younger than those with uninvolved interpectoral nodes. As it is young women who benefit from specific adjuvant therapy, then removal of the interpectoral nodes is likely to identify a number of premenopausal women with involved nodes who would otherwise be considered as node negative. Although others have suggested that patients with isolated interpectoral node involvement have a good prognosis [3, 10], 2 of the 3 patients with only involved interpectoral nodes in the current series developed metastatic disease within 12 months of diagnosis, indicating that not all patients with involved interpectoral nodes alone have a favourable outcome.

Interpectoral nodes can be easily palpated during an axillary node clearance on the under surface of the pectoralis major muscle and we would support the view that during all axillary clearances, interpectoral nodes should be sought and if they are identified, they should be excised and submitted for pathological examination [11].

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