Isolated Regional Lymph Node Dissection

Morbidity, Mortality and Economic Considerations

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Between 1971–1979, 330 consecutive isolated regional lymph node dissections (RLNDs) were performed as therapeutic procedures for metastatic disease, at the University of Louisville Affiliated Hospitals and the Ellis-Fischel State Cancer Hospital in Columbia, Missouri. This retrospective analysis includes 133 radical neck RLNDs, 87 axillary RLNDs, and 110 superficial groin RLNDs. All accessioned cases were elective and were performed as isolated procedures, discrete from resection of contiguous or remote organs. No patients received preoperative irradiation, chemotherapy or immunotherapy. Forty-eight per cent of the 330 RLND procedures resulted in some form of postoperative complication. However, 91% of the incurred morbidity was localized to the operative site and was related to serum collection and/or flap necrosis. The occurrence of postoperative complications for each RLND site resulted in a prolongation of the patients' hospital stays by a mean of 9 days, and was most extended for the superficial groin RLND by a mean of 11 days. Nine patients (3%) died. These data for morbidity and mortality rates, as well as the implicit economic impact, represent substantial factors in the utilization of elective RLND.

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REGIONAL LYMPH NODE dissection (RLND) remains a widely accepted surgical adjunct applicable in the therapy of metastatic nodal disease. RLND serves either to improve the probability of absolute tumor control, or to obviate local problems, such as ulceration, hemorrhage, or lymphatic obstruction, which attend unchecked tumor progression in a lymph node basin.

The most debatable application of RLND applies when a clinical stage I primary neoplasm is to be, or has been, treated in the absence of clinically perceptible metastatic disease in the primary accessible lymph node drainage basin. Vital queries include: 1) the frequency of clinically occult metastatic cancer, and 2) whether survival is truly favorably influenced when treatment of the lymph nodes is conducted while still microscopic as compared to clinically perceptible disease in the same drainage area, at a presumably later time.

To properly assess the value of RLND procedures, one must also recognize the inherent morbidity and mortality rates incurred in the use of this modality, and weigh the risks against the potential patient benefit. While the role of RLND for some illnesses is controversial with regard to patient survival benefit, the morbidity and mortality rates associated with this procedure are real and identifiable, and are sparsely documented at present.

Materials and Methods

Clinical Material—Study Design

The study consisted of 330 consecutive patients who had RLNDs performed between 1971–1979 by the resident and attending staffs physicians at the University of Louisville Affiliated Hospitals and Ellis-Fischel State Cancer Hospital. To define the true morbidity and mortality rates of RLND, three operative sites were studied retrospectively. The operations evaluated included 1) classic radical neck dissection, 2) axillary dissection, and 3) superficial groin dissection. All accessioned cases were elective and were performed as isolated procedures, discrete from resection/dissection of contiguous or remote organs. All operations were performed for metastatic disease, exclusively comprised of malignant melanoma or epidermoid carcinoma. All wounds were closed primarily with

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TABLE 1. *Overall Morbidity and Mortality Rates of 330 Consecutive Isolated Regional Lymph Node Dissections (RLND)**

Site of RLND	Total		Morbidity		Mortality	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Neck	133	(40)	50	(38)	6	(5)
Axilla	87	(27)	43	(49)	3	(3)
Groin	110	(33)	66	(60)	0	(0)
	330	(100)	159	(48)	9	(3)

* All data adjusted to nearest whole number.

closed suction catheter drainage and in no circumstances were any wounds covered with split thickness skin graft. The patients included in this study did not receive pre- or postoperative irradiation, cytotoxic chemotherapy, or immunotherapy for treatment of the primary neoplasm or nodal basin sites.

The total group of patients were categorized as follows: 1) no complications, 2) nonlethal complications, and 3) deaths within 30 days after operation. The nonlethal complication group was further subdivided into a) complications confined to the RLND operative sites, which were classified as "local only," b) complications considered remote from the operative site, which were labeled "systemic only," and c) combinations of nonfatal complications, which were categorized as "local and systemic." Each RLND site was evaluated with regard to the patient's age, and its influence on morbidity and mortality rates. Additionally, the occurrence of postoperative complications for each RLND site was studied to assess the economic morbidity incurred with prolonged hospitalization. This data reflects only in-hospital morbidity and mortality rates, and does not encompass potential late complications for the three RLND sites.

To document the economic morbidity rate, surgically-related hospital time was defined as the interval (days) from operation to discharge/death. Thus, the extended hospitalization represented any interval (plus days) beyond the mean postoperative hospital stay observed for the uncomplicated procedures.

Results

Isolated RLNDs in 330 consecutive patients are reviewed in Table 1, of which 40% were radical neck dissections, 27% were axillary dissections and the remainder (33%) were superficial groin dissections. Each operative site is individually analyzed in Tables 2–4.

Neck RLND (Table 2)

Fifty-eight per cent of the patients who underwent neck RLNDs experienced no complications. Nonfatal complications were observed in 38% of the group, of which 47 complications (94%) were confined to the neck. Among the 133 total neck RLNDs, local problems included seromas in 22 patients and tissue necrosis and/or wound infection in ten patients. Injury to cranial nerve(s) V, VII, IX, or XI occurred in seven patients. The remainder of the complications comprising this RLND site were thoracic duct injury in three patients, severe facial edema in two patients, early postoperative hemorrhage in one patient, protracted lymphatic fistula in one patient, and vocal cord paralysis in one patient.

Two patients had both local and systemic complications, both of whom incurred a cerebrovascular accident (CVA), associated with seroma or wound infection. One patient had occult persistent fever (more than 30 days), which represented the only systemic complication of this group not associated with local problems.

The highest mortality rate (5%) incurred for the three operative RLND sites was observed in neck dissections. Three deaths were attributed to wound infections with associated pneumonia. Two patients died of postoperative cardiogenic shock and subsequent cardiopulmonary arrest. One death was secondary to CVA. Analysis of the length of surgically-related hospitalization of the patients who underwent neck RLND showed a mean extended interval of hospitalization of eight days over those who had no complications, and of four days over the group of patients who underwent neck dissections.

TABLE 2. *Immediate Postoperative Results of 133 Neck RLND**

	Number	Mean Patient Age (Years)	Mean Hosp. Days Surg. to Disch./Death	Per Cent
Total group	133	66	14	40
No complications	77	65	10	58
Complications	50	67	18	38
Local (only)	47	67	18	94
Local & systemic	2	66	30	4
Systemic (only)	1	—	—	2
Deaths (<30 days)	6	72	11	5

* All data adjusted to nearest whole number.

TABLE 3. *Immediate Postoperative Results of 87 Axillary RLND**

	Number	Mean Patient Age (Years)	Mean Hosp. Days Surg. to Disch./Death	Per Cent
Total group	87	62	16	26
No complications	41	60	12	47
Complications	43	64	19	50
Local (only)	42	64	19	98
Local & systemic	1	—	—	2
Systemic (only)	0	—	—	—
Deaths (<30 days)	3	84	12	3

* All data adjusted to nearest whole number.

Axillary RLND (Table 3)

Table 3 shows the immediate postoperative results of 87 axillary RLNDs of the classical type, performed for metastatic trunk or upper extremity neoplasms, discrete from en bloc breast resections. One-half of this subset of patients had nonfatal complications, of which all but one were solely confined to the operative site. The complications observed included delayed wound healing secondary to serum collection (23 patients), tissue necrosis and/or wound infection (18 patients), or postoperative hemorrhage (one patient). The only combined local and systemic morbidity rate observed was in a patient with wound seroma, who subsequently had mental deterioration secondary to transient ischemic attacks. No other systemic complication was noted.

The group of patients who underwent axillary RLND represented the second most common site of mortality. The etiologic factors in the three patients who died in the postoperative period were single instances, each, of pneumonia, myocardial infarction, and anesthetic-related cardiopulmonary arrest.

The total group of patients who underwent axillary RLNDs had a mean surgically-related hospital time of 16 days. The patients' periods of hospitalization were extended by a mean of seven days if either local/systemic operative morbidity was encountered.

Superficial Groin RLND (Table 4)

In Table 4, the immediate postoperative results are shown for superficial groin RLND performed exclusively via oblique incisions, as described by Spratt, Schieber and Dillard[14] for lower extremity primaries. This RLND site sustained operative complications most frequently, and the vast majority of complications (83%) were wound-related, of which 52 (95%) were delayed healing secondary to serum collection, flap necrosis, and/or infection. The remainder of local complications were contributed by advanced cellulitis, postoperative hemorrhage, and early edema of the distal extremity.

Systemic morbidity was related to genitourinary infection (three patients), CVA (two patients), thrombophlebitis of the leg or arm (two patients), anaphylactic reaction (one patient), or transient ischemic attack (two patients). The local complications in this subgroup were comprised of serum collection, flap necrosis, and/or wound infections.

Isolated systemic morbidity was observed in one patient secondary to myocardial infarction. The superficial RLND group represented the only group in which no operative mortality occurred.

The total subgroup of superficial groin RLNDs had a mean surgically-related hospital time of 22 days, which exceeds the mean neck and axillary RLND sites by (+) 8 and (+) 7 days, respectively. In addition, the occurrence of any groin complication extended that mean hospitalization another 11 days.

Overall Morbidity and Effect on Surgically-related Hospital Time (Table V)

The impact of prolonged hospitalization as a consequence of any complication whether local, systemic,

TABLE 4. *Immediate Postoperative Results of 110 Groin RLND**

	Number	Mean Patient Age (Years)	Mean Hosp. Days Surg. to Disch./Death	Per Cent
Total group	110	58	22	33
No complications	44	55	15	40
Complications	66	62	26	60
Local (only)	55	61	27	83
Local & systemic	10	69	29	15
Systemic (only)	1	—	—	2
Deaths (<30 days)	0	—	—	0

* All data adjusted to nearest whole number.

or both is detailed in Table 5. Any observed complications had the effect of prolonging the hospital stay by 7–11 days (mean: eight days). Obviously, it would be of interest to define any real differences in morbidity and mortality rates between those procedures performed for prophylactic or therapeutic indications. However, the procedures reported in this series were performed for therapeutic purposes alone and, therefore, cannot provide this information.

TABLE 5. *Overall Effect of any Complication on Postoperative Hospital Stays (Days)**

Region	No Complications	Any Complications	Extra Days
Neck	10	18	(+)8
Axilla	12	19	(+)7
Groin	15	26	(+)11
Mean	13	21	(+)8

* All data adjusted to nearest whole number.

Discussion

The overall contribution of RLND to the attack on neoplastic disease in regional nodal basins must be weighed in terms of its overall benefit with appropriate concern for the inherent physical complications, and financial burden, and intrinsic mortality rate. The escalation of the cost of medical care accentuates the responsibility of surgeons to periodically reassess the indications for many treatments. Uniform circumstances in which RLND is likely to remain of greatest benefit include 1) clinical evidence of metastatic regional (nodal) disease existing in the presence of disease otherwise resectable for cure (*e.g.*, primary lesions of head with cervical metastases, or the classical standard mastectomy in which no neoplasm is demonstrable beyond limited axillary nodal disease [N_1]); 2) regional nodal disease, in which the primary anatomic dissection of the organ involved facilitates, or is essential to, adequate resection (*e.g.*, colectomy); 3) palliative RLND to allow satisfactory control of metastatic deposits, which have the potential for ulceration or skin fixation (*e.g.*, cervical or groin RLND for neoplasms which are prone to major vessel invasion and/or remain biologically radioresistant).

The determinants of in-hospital morbidity and mortality rates related to RLND for metastatic disease included age, anatomic site, extent of dissection, coexistent intercurrent disease, and stage of disease. Technical factors, likewise, influence wound healing and include regional blood flow, type of incision, presence or absence of infection, hemostasis, and method of or adequacy of drainage. Local wound healing problems emerged as the dominant, but nonlethal, complication observed in the three anatomic sites of this series.

Until recently, data has been unavailable to refute (or confirm) the early and late complications related to elective or therapeutic RLND. The literature is replete with controversy regarding the advocacy of the "prophylactic" (elective) procedure for malignant disease, and is beyond the scope of this discussion, but has been reviewed by us previously.[7,10] However, the liberal acceptance of the RLND may not be justified as morbidity and mortality rates are real and identifiable. An objective comparison of cumulative data, regarding isolated RLND for a variety of neoplasms, has established a measurable hospital mortality rate of 1.5%.[10,11] We have previously extended this analysis and the effect of complications on the length of hospital stay for inguinal RLND. A collective mortality rate of 0.8% was observed for nine series,[2–4,8,9,12–16] but these reports are highly variable in quality, and do not differentiate between isolated dissection and those with contiguous resections.

Budd et al.,[1] in a series of 146 consecutive patients having mastectomy operations (total, modified radical, and radical), observed a complication rate of 63.6% but no deaths occurred. Seventy-three per cent of the 175 complications of this review were local (only) or wound-related, with etiologic factors similar to those of the present series.

The high incidence of local complications is further supported by Harris, Gumport and Maiwandi[5] in their review of 78 elective RLNDs performed for melanomas of the upper extremities, which resulted in a morbidity rate of 51%. Reporting on 95 superficial groin RLNDs, Harris et al.[6] noticed 27 serum collections, 18 instances of skin slough, and 21 cases of clinical lymphedema. The frequency of complications noticed by these investigators is quite similar to the overall operative morbidity rate of this series.

Although one cannot statistically relate age and morbidity and mortality rates, the mean ages of the patients who had postoperative complications or died was appreciably higher than those patients experiencing no operative complications (Table 2). Furthermore, the adverse variables (cardiovascular and respiratory) responsible for death are frequently associated with the elderly group.

Most evident in the current analysis of 330 RLNDs is that operative mortality rate was greatest in the neck (5%) and axilla (3%), with no deaths observed for the superficial groin RLND. Conversely, the morbidity rate was lowest in the neck (38%) and highest in the groin (60%), with a complication of any type occurring in 48%. This cumulative morbidity rate directly con-

strues a meaningful principle not to be remiss of concern, in that, RLND has associated with it an early or late complication for one of every two dissected regional lymphatic sites. Thus, a discriminating selection of patients appears mandatory, especially when the available surgical expertise and technique cannot uniformly provide minimal operative morbidity and mortality rates.

Expectantly, any extended hospitalization period, secondary to wound complications, has profound economic impact. This becomes especially true when extended convalescence was necessary in 38–60% of the three patient RLND groups, with a range of 7–11 days and a mean of eight days. These considerations must be carefully weighed to assess fully the overall value of the prophylactic (elective) RLND in patients with clinical evidence of established disease.

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