Dissections of regional lymph nodes for treatment of skin cancer: predicting annual caseloads that will optimise outcomes

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ABSTRACT

INTRODUCTION Dissection of regional lymph nodes (RLNs) can lead to significant morbidity and a high prevalence of complications. Published guidance states that these procedures should be carried out by surgeons who are members of a specialist skin multidisciplinary team who carry out a combined minimum of 15 axillary/groin dissections per year. However, there is little evidence to guide this minimum figure of procedures. We report on the burden of service provision and prevalence of complications across the South West of England and Wales.

METHODS A 12-month review of dissections of RLNs for skin cancer was undertaken covering five Plastic Surgery Units with a collective catchment of 8.4 million people. Detailed data were collected on patient demographics, pathology, timing of surgery, and prevalence of complications.

RESULTS A total of 163 dissections were carried out. Forty-three per cent of patients experienced one or more complication. In that 12-month period, an average of 8 axillary/groin dissections was carried out per surgeon. A funnel plot demonstrated that the prevalence of complications for individual surgeons was within the limit of the plot but, in many cases, this was based only on a relatively small number of procedures per consultant. If surgeons carried out 10 procedures per year, the upper and lower limits on the plot were 73% and 11%, respectively.

CONCLUSIONS Funnel plots can provide a useful guide as to whether the prevalence of complications for procedures for individual surgeons lies within acceptable limits. Based on these results, 10 procedures per consultant per year should be sufficient to enable meaningful assessment of the prevalence of complications.

KEYWORDS

Dissection of regional lymph nodes – Complications – Audit – Service provision – Skin cancer

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If tumour cells metastasise to regional lymph nodes (RLNs), nodal dissection is often necessary to reduce the risk of disease recurrence. After the surgical procedure, histological analyses of the block dissection specimen can also provide useful prognostic information and guide appropriate use of radiotherapy and chemotherapy.

In 2006, the UK National Institute for Health and Care Excellence (NICE) issued guidance on treating people with skin tumours (including melanoma). In 2010, NICE revised guidelines for the management of cutaneous melanoma. In relation to dissection of RLNs, this guidance states that, within the specialist skin cancer multidisciplinary team, at least two surgeons should have a designated interest in

nodal dissection and undertake ≥ 15 block dissections (groin or axilla) each year.¹

The prevalence of complications and morbidity associated with dissection of RLNs can be high: 28–77%.^{2–8} Groin dissections are typically associated with a higher prevalence of complications than axillary dissections.^{2,9–12} In 1992, Baas *et al* undertook a retrospective review of 151 consecutive groin dissections. They reported a prevalence of 17% for seroma, 9% for wound infection, 3% for wound necrosis, and 20% for wound oedema.¹³ Radiotherapy may be required after dissection of RLNs but its use is controversial and further complications can occur as a result (lymphoedema, radiation dermatitis, wound infection).¹⁴

The South West of England and Wales is a large region of the UK served by five Plastic Surgery Units (PSUs) with a collective catchment of 8.4 million people (which corresponds to 15% of the UK population according to the UK Census carried out in 2011). The present study was undertaken to assess the burden of service provision, concentration of workload, and prevalence of complications across this region. The number of procedures required to enable meaningful audit and comparison of outcomes against accepted mean values is discussed.

Methods

We conducted a 12-month retrospective review of dissection of RLNs for treatment of metastatic skin cancer in 5 PSUs in the South West of England: Bristol (Frenchay Hospital); Exeter (Royal Devon & Exeter Hospital); Plymouth (Derriford Hospital); Salisbury (Salisbury District Hospital); Swansea (Morriston Hospital). All patients who had undergone an axillary, groin or neck dissection between 1 January 2012 and 31 December 2012 were included in the analyses.

Patient demographics, primary pathology (including site and Breslow depth), type of dissection (groin/axillary/neck), length of stay in hospital after surgery, and prevalence of complications was recorded. The time taken from the date of identification of an abnormal RLN to the date of dissection was also noted.

Results

Over the 12-month period, 163 dissections were undertaken, of which 75 (46%) were axillary, 63 (39%) were inguinal/ilio-inguinal, and 25 (15%) were neck dissections. The patient cohort was 101 males and 62 females with a mean age of 66 (range, 28–81) years. Primary disease was melanoma in 157 cases (84%), squamous cell carcinoma in 23 cases (14%) and Merkel cell tumour in 3 cases (2%). Mean Breslow thickness was 4.1 (range, 0.4–16) mm for melanomas and 9.5 (range, 1–30) mm for squamous cell carcinomas.

On average, it took 48±4.1 (range, 0–345) days from the date of identification of an abnormal RLN to the date of dissection. Patients stayed in hospital for an average of 7.0±1.1 (range, 0–157) days after dissection. Several patients had a particularly long inpatient stay after surgery. Median duration of stay in hospital was considerably less than the mean value: 4 days. Inguinal/ilio-inguinal, neck and axillary dissections stayed on average 9.8, 6.8 and 4.7 days, respectively.

Thirty-three patients (20%) had a wound infection that necessitated antibiotic administration; 16 (10%) had wound breakdown; 36 (22%) developed a seroma that necessitated drainage; 19 (12%) had to return to the operating theatre with a complication relating to the dissection; 20 (12%) were re-admitted to hospital after discharge from hospital with a complication relating to the dissection. Types of complications varied between nodal basins (Fig 1).

Postoperative radiotherapy was given (or planned) in 49 (30%) cases. There was wide variation in the percentage of

Figure 1 Prevalence of complications for each nodal basin

patients who required postoperative radiotherapy between the different PSUs: 14–59%.

Of the 138 inguinal/ilio-inguinal and axillary dissections undertaken (excluding neck dissections), 60 patients (43%) experienced one or more complication, a figure similar to that recorded in other studies. On average, eight (range, 1–23) of such procedures were carried out per surgeon per year. A funnel plot of the prevalence of complications per individual surgeon versus the number of procedures carried out over the 12-month period demonstrated that all surgeons had a prevalence of complications of procedures that was within the limit of the plot (Fig 2). If surgeons undertook 10 procedures over a 12-month period, the upper and lower limits of acceptance were 73% and 11%, respectively. If surgeons carried out 15 procedures, the upper and lower limits were 69% and 17%, respectively.

Discussion

Dissection of RLNs is frequently associated with a high prevalence of complications. Various factors can contribute to this problem. For example, it can be difficult to maintain cleanliness in the groin and the axilla and, as a result, infection and wound breakdown is more likely. In addition, when removing RLNs, disruption of the lymphatic architecture is inevitable, leading to a high risk of seroma and lymphoedema with their associated risks (including infection).

Various factors can help to reduce the risk of complications: early diagnosis of nodal metastasis; early postoperative mobilisation; appropriate use of venous thromboembolic prophylaxis after surgery.^{10,15} Groin dissections are, in general, associated with a greater prevalence of complications than axillary dissections, as demonstrated here and in other studies.^{10,11} Patients with a high body mass index (>30 kg/m²) undergoing inguinal dissection are at a greater risk of developing complications.^{5,9} If undertaking groin dissections, some surgeons preserve the saphenous vein and may also transpose the sartorius muscle to provide more robust and reliable cover of inguinal vessels. However, the benefit of these additional measures remains unclear and controversial.

Figure 2 Funnel plot of the prevalence of complications for procedures for individual surgeons versus the number of dissections of regional lymph nodes carried out over a 12-month period (excluding neck dissections (in accordance with Improving Outcome Guidance)). Mean $\pm$ two standard-error value is shown by the dashed line.

It has been proposed that the risk of complications can be reduced and outcomes improved if surgeons who undertake dissection of RLNs have a designated interest in skin-cancer surgery and carry out ≥ 15 block dissections (groin or axilla) per year as an individual or as a team of two or more surgeons.¹ There is little evidence to guide this minimum figure of block dissections, but this dearth of evidence has potential cost implications in relation to service delivery and resource allocation.

In the present study, a funnel plot was used to assess the prevalence of complications of procedures for individual surgeons in relation to the mean prevalence of complications of procedures for the entire group. The funnel plot was created using upper and lower limits based on twice the value for standard error for the mean prevalence of complications. All surgeons had a prevalence of complications for procedures that was within the limit of the plot. However, for those surgeons who only undertook a few procedures, the values for standard error varied widely (extending to 100% and 0%) (Fig 2). For these surgeons, determination of whether the prevalence of complications deviated significantly from the mean value for the group was not possible. If a surgeon undertook 10 procedures, then 45% of procedures would be expected to have 1 or more complications, and at this point the funnel plot ranged from 11% to 73%. Therefore, a surgeon for whom $\geq 8/10$ patients experienced a complication could be considered to have a significantly worse prevalence of complications than the mean value. Also, a surgeon for whom $\leq 1/10$ patients experienced a complication could be considered to have a significantly better prevalence of complications than the mean value. At the currently recommended figure of 15 procedures, the funnel plot ranged from 17% to 67%. Overall, 6/15 patients would be expected to experience one

or more complications and $\geq 11/15$ would have a significantly worse, and $\leq 2/15$ a significantly better, value than the mean value.

Based on these results and in the absence of other evidence, we propose that ten procedures per consultant per year should enable meaningful assessment of the prevalence of complications, and may help optimise use of expertise and resources within departments. Ongoing audit over several years will be crucial. More procedures carried out per consultant will lead to a narrowing of standard-error values. If, over time, the prevalence of complications per surgeon is above or below the limit, then this difference is likely to be significant (ie better or worse than the mean value).

Conclusions

Data for the outcomes of procedures carried out by individual surgeons will become more widely available in the future. Such data will help to optimise patient care by enabling openness and trust between surgeon and patient. The data published here reflects current practice in the South West of England and Wales. Definition of the minimum number of procedures that will optimise outcomes and lead to best allocation of resources and expertise is difficult. Hence, continual audit of results and comparing such results with mean values is important.

We propose that surgeons should undertake ≥ 10 procedures per year to enable meaningful audit. Such a minimum should be subject to regular and ongoing review. The more procedures that are carried out, the more accurate and reliable will be the data. Hence, surgeons should plan to record data over several years. These findings are also likely to be relevant to surgeons who undertake dissections of RLNs for diseases other than skin cancer (eg perineal cancer).

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