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Title page

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*Restricted Venos Access after Lymph Node Dissection – No Evidence (**Voodoo**)*

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Abstract:

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Lymphoedema affects 21% of patients undergoing axillary lymphadenectomy and 5.6% of patients following sentinel lymph node biopsy^{1,2}, most commonly for breast cancer or melanoma. Sufferers are estimated to cost \$USD10,000 more per year in healthcare expenditure than patients without lymphedema³. It is unquestionably an undesirable complication of lymph node surgery; preventive and therapeutic strategies are thus vital. National and international guidelines for the prevention and treatment of lymphoedema have, for years, recommended avoidance behaviours to minimise the risk of developing lymphoedema^{4,5}. A particular focus of guidelines is the avoidance of skin puncture (venepuncture, injections and intravenous catheterisation) and BP measurements. In Australia, the *Cancer Australia Guide for women with early breast cancer* suggests using the *unaffected* arm for these procedures⁴. Overseas, the Lymphoedema Framework, in its *International Consensus Best Practice for the Management of Lymphoedema*, which is endorsed by 19 lymphology organisations across Britain, Europe and North America, lists “Trauma (venepuncture, blood pressure measurement, injection) in an 'at risk' arm” as a risk factor⁵. Even in the authors’ own institution, patient information sheets provided after axillary surgery promotes avoidance of these same procedures to reduce the risk of developing lymphoedema.

The origin of recommendations to avoid needle puncture is unclear but seems to stem from a succession of low level studies including small, retrospective series and case reports describing lymphoedema in patients suffering cellulitis following radical mastectomy. This led to the conclusion that any portal of bacterial entry could initiate lymphoedema and,

therefore, recommended avoidance of venepuncture³. Whilst there is an association between infection and development of lymphoedema, the role that venepuncture and blood pressure measurements play remains unproven.

Clark, in 2005, produced the only prospective study to suggest an association between venepuncture and lymphoedema⁶. Although this study suggested a relative risk of 2.4 with skin puncture, it has been widely criticised for not specifying the timing of the development of lymphoedema in relation to the skin puncture, thereby creating substantial uncertainty around the association^{1,7}. Further, they only recorded in-hospital venepuncture in the days after surgery, which inaccurately reflects the real exposure.

Multiple authors have attempted to interrogate this subject and review the evidence. Jakes and Twelves⁸ reviewed seven studies and Cemal³ reviewed nine and both concluded that there is no robust evidence to support an increased risk of lymphoedema following 'risky' behaviour. Likewise, Cheng et al, in their review state "evidence from various sources suggests that neither blood pressure measurement nor skin puncture in the ipsilateral limb causes lymphoedema"¹. In 2008, the National Breast and Ovarian Cancer Centre analysed 39 studies which failed to find a causal relationship between BP measurements or skin puncture and the development of lymphoedema⁹. These reviews, however, have all been limited by the quality of their covered studies (level III or below) and a review by McLaughlin eloquently summarised that most precautionary recommendations remain neither scientifically proven nor disproven by the evidence².

More recently, however, the scientific rigour aimed at answering this question has increased, producing level II evidence repudiating avoidance behaviour recommendations. In 2016, Ferguson et al prospectively screened 632 patients for lymphoedema following

either sentinel node biopsy or lymphadenectomy. They performed 3,041 arm measurements and reported the number of skin punctures since the last measurement. They found no association between arm volume and blood draws ($P=0.62$) or injections ($P=0.77$)⁷.

While some of the published guidelines, prior to the Ferguson study, acknowledged the lack of robust evidence to guide recommendations, they argued that, in the absence of evidence, a “common sense” approach of avoiding skin puncture, injury, tight clothing and BP measurements is a minor imposition on patients compared to the enormous impact of lymphoedema⁵. However, this approach is problematic. The cancer-patient population is already psychologically vulnerable, *so the language used to provide them with advice is important*. When patients are advised that certain behaviours are “risky”⁹ and to avoid “whenever possible”⁴, we can be confident that these highly anxious patients will strive to adhere to this advice. In addition, precautionary advice can trigger overprotection of the limb, leading to disuse. Lee et al, analysed women’s intention to avoid a supposedly risky behaviour (exercise). They found that women who received arm care advice or had a fear of lymphoedema were much more likely to avoid use of their arm¹⁰.

In the clinical setting, this fear manifests as patients insisting on having venepuncture or cannulation on alternate sites, often causing significant discomfort. Worse still, those patients with poor alternate venous access sites will be subjected to the risks of central venous cannulation or inhalational induction of anaesthesia if surgery is required. This is frequently despite patients having readily accessible veins on the ‘at risk’ arm that they have been dissuaded from using through the misinformed fear of developing lymphoedema.

If we are to practice in an evidence-based framework, it should be accepted that there now exists convincing high-level data to cease the propagation of avoidance behaviours to prevent lymphoedema. Yet even if the evidence refuting the risk still does not satisfy us, it should be remembered that preventive recommendations must not themselves cause adverse health or quality of life effects. Either way, it is time to better educate our patients on the risks and amend our preventive behaviour recommendations. And whilst we avoid perpetuating the myths, we should instead promote the behaviours for which we have a substantial evidence base to reduce the risk of lymphoedema: maintenance of a healthy weight, including exercise, and avoidance of infection^{2,3}. Our patients come to us, as surgeons, to seek our advice and, mostly, heed that advice. It is, therefore, our task to guide these patients away from the voodoo of the past to a more enlightened, evidence-based and contemporary holistic approach.

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