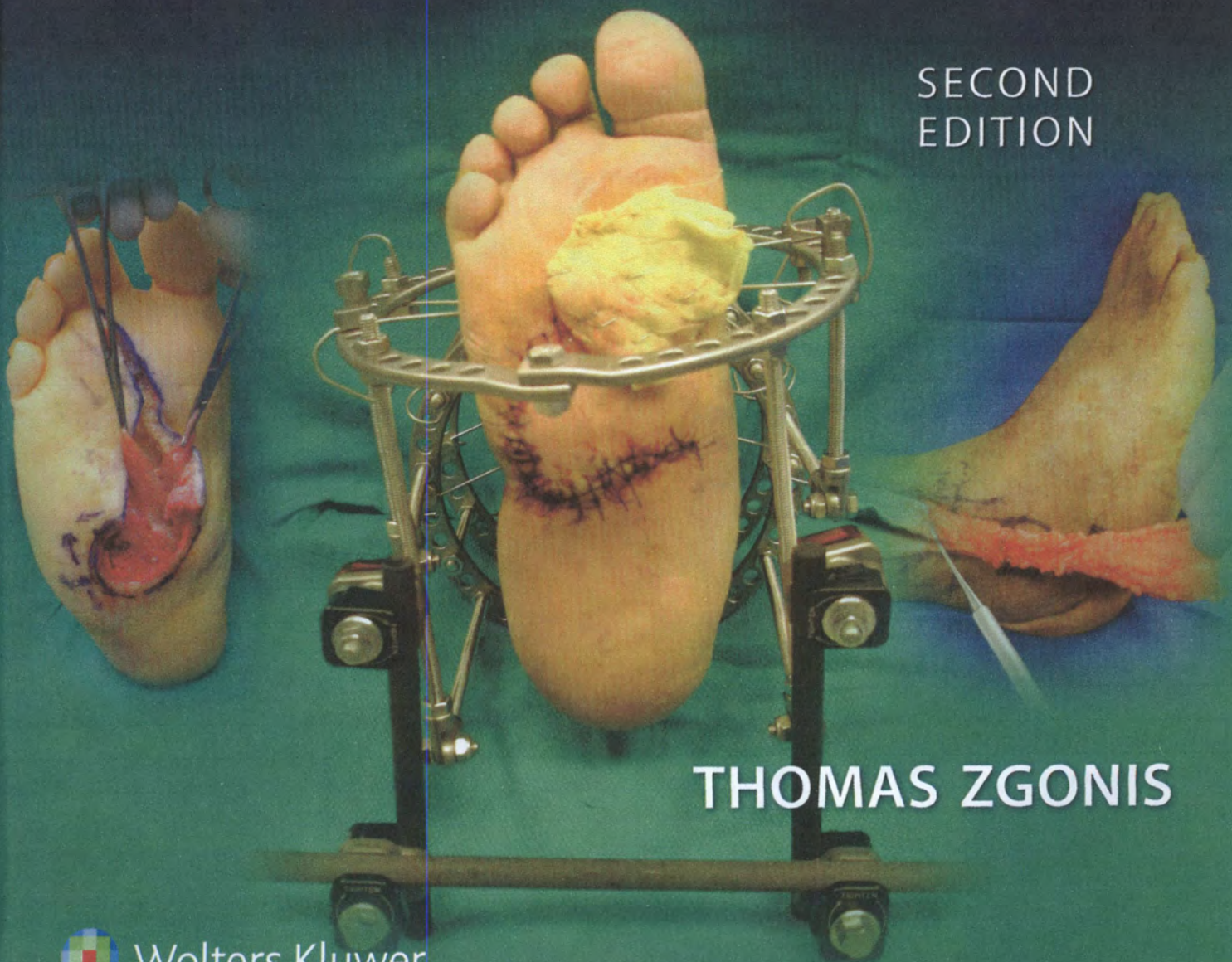




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Surgical Reconstruction of the **DIABETIC** **FOOT** and **ANKLE**

SECOND
EDITION



THOMAS ZGONIS

Local Random Flaps for Soft Tissue Coverage of the Diabetic Foot

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INTRODUCTION

Successful surgical reconstruction of diabetic foot pathology is one of the biggest challenges surgeons face. Although there are a variety of surgical treatments, local random flaps for soft tissue coverage of the diabetic foot are a reliable option. In the mid-19th century, Gillies and Millard described the art of plastic surgical reconstruction (51). During that time, local flaps began to gain popularity for healing diabetic foot soft tissue defects, as they aimed to target the isolated pathology without sacrificing healthy tissue. Over the next several years, the research on local flaps expanded and new technique options and success rates were established. Current research suggests flaps are especially useful for reconstruction of the plantar aspect of the foot because skin grafting is not optimal as a reconstructive option for weight bearing areas (49,50,127). In the surgical reconstruction of diabetic foot pathology, 90% of cases are treated with simple operative techniques, whereas 10% require complex flap reconstruction to adequately address and treat the diabetic patient (36).

PREOPERATIVE CONSIDERATIONS AND SURGICAL EVALUATION

When deciding on the use of local flaps for the treatment of diabetic foot pathologies, several factors must be considered. Prior to surgical intervention, preoperative planning is necessary to include evaluation of the size and depth of ulceration/defect and management of infection (3,6–8). Other key considerations include location, quality, vascularity, thickness, function, color, texture, and turgor of the tissue (49,50). Local skin flaps should be evaluated for tissue mobility and elasticity; otherwise, the flap could be under tension after relocation. Additionally, the composition of the skin at the donor site should be equal or greater in durability than the recipient site.

Medical Comorbidities

Patient past medical history and comorbidities are one of the most important preoperative considerations. Comorbidities

such as diabetes mellitus, hypertension, peripheral arterial disease, venous insufficiency, anemia, neuropathy, malnutrition, renal disease, hemodialysis, infection, history of abnormal scarring, bleeding abnormalities, age, musculoskeletal abnormalities, and use of tobacco should all be addressed preoperatively and optimized if possible (9,10).

Current research indicates that hemoglobin A_{1c} levels over 8% are associated with delayed wound healing, as is the hypoxia environment caused by tobacco use. Additionally, when evaluating a diabetic patient for a potential local flap preoperatively, it is important to consider kidney function because end-stage renal disease patients often have decreased fibroblast function which corresponds to delayed wound healing (10,33,68,91). Also, although patient's age is not a relative contraindication for flap closure, research shows that insensate patients ≤ 40 years of age have better outcomes when compared to patients over 40 with regard to flaps on the sole of the foot (25).

In addition to all of the preceding factors, the patient's occupation and capacity to deal with lost time from work and economic impact should be considered. The patient's expectations regarding the outcome of the surgery, possibility of additional surgeries, and potential risks (e.g., amputation) should be taken into account.

Vascular Assessment

Vascular insufficiency is often detrimental to flap success. When insufficiency is suspected preoperatively, a vascular surgery consultation is strongly recommended. Parameters to consider vascular consultation include ankle-brachial index (ABI) of < 0.7 , toe-brachial index (TBI) < 40 mmHg, or transcutaneous oxygen tension (TcPO₂) levels < 30 mmHg. Abnormal noninvasive vascular studies are a direct predictability for wound healing (11,12,18).

Diabetic patients usually have multiple medical comorbidities, and as such, it is not uncommon for them to have calcified vessels. This vessel calcification results in vascular noninvasive testing with falsely elevated ABIs (> 1.3). For this reason, TBI is a more reliable indicator of pedal flow because the small vessels of the toes are generally spared of calcification (13–22).