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**PURPOSE:** Anatomic and functional descriptions of trunk and breast lymphedema following breast cancer treatment are emerging as indicators of lymphatic dysfunction, better elucidating the disease process. ICG-lymphangiography has been instrumental in characterizing this dysfunction in extremity lymphedema and can be used to assess other regions. Previous work has established a validated Trunk Lymphedema Staging System (TLSS) to characterize such affected areas. This study aims to identify risk and protective factors for the development of truncal and upper extremity lymphedema using alternative lymphatic flow, providing implications for medical and surgical treatment.

**METHODS:** Patients undergoing revisional breast surgery with suspicion of upper extremity lymphedema between 12/2014 and 3/2020 were offered lymphangiography. The breast and lateral/anterior trunks were visualized and blindly evaluated for collateral axillary and inguinal lymphatic flow. Summary statistics were computed, and a linear-weighted Cohen's Kappa statistic was calculated comparing alternative drainage evaluation. Binomial regression was used to compute relative risks (RR). Significance was assessed at  $\alpha=0.05$ .

**RESULTS:** 86 sides (46 patients) were included. 12 sides underwent no treatment and were considered controls. 88% of the non-controls had alternative lymphatic flow. This was seen in ipsilateral axillae (64%), ipsilateral groins (57%), contralateral axillae (20.3%), and contralateral groins (9.3%). Cohen's Kappa for alternative drainage was  $0.631 \pm 0.043$ . Ipsilateral axillary and contralateral inguinal drainage was associated with a reduced risk of developing truncal lymphedema (RR 0.78, CI 0.63-0.97,  $p=0.04$ ; RR 0.32, CI 0.13-0.79,  $p=0.01$ , respectively). Radiation therapy increased the risk of truncal and upper extremity lymphedema (RR 3.69, CI 0.96-14.15,  $p=0.02$ ; RR 1.92, CI 1.09-3.39,  $p=0.03$ , respectively). Contralateral axillary drainage and axillary lymph node dissection increased the risk of upper extremity lymphedema (RR 4.25, CI 1.09-16.61,  $p=0.01$ ; RR 2.83, CI 1.23-6.52,  $p=0.01$ , respectively).

**CONCLUSIONS:** Building upon previous work on truncal lymphedema, this study shows risk and protective factors for the development of truncal and upper extremity lymphedema. Most prevalent alternative channels drain

to the ipsilateral axilla and groin. Ipsilateral axillary and contralateral inguinal drainage are protective against truncal lymphedema. Patients with radiation, axillary lymph node dissection, and contralateral axillary drainage have the highest risk of upper extremity lymphedema. This study amplifies existing data on collateralization in post-operative breast cancer patients while expanding its implications in trunk and breast lymphedema. These findings have important clinical implications for post-operative manual lymphatic drainage and for determining eligibility for lymphovenous bypass surgery.

## **Surgical Capacity Assessment and Leverage in the PalEstinian Land (SCALPEL-I) Study: The First Nationwide Plastic Surgery Capacity Evaluation in Palestine**

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**BACKGROUND:** Access to surgical care in low-to-middle-income countries (LMIC) especially in war-torn and refugee-densely populated areas such as Palestine is increasingly recognized as a global health priority. Plastic surgical capacity in Palestine has not been evaluated before in the current published literature. The aim of this study was to conduct the first systematic, comprehensive, and nationwide evaluation of plastic surgical capacity in Palestine.

**METHODS:** This is a cross-sectional study conducted between December 2022 and February 2023 and included all healthcare facilities that provide plastic surgery services in Palestine except private centers run by non-surgeons. A modified version of the validated 5-domain Personnel, Infrastructure, Procedures, Equipment, and Supplies (PIPES) tool was administered in each facility through a

face-to-face interview. Hospitals' PIPES indices were computed; data were aggregated and analyzed for geographic and private/public disparities.

**RESULTS:** A total of 9 facilities were included in the study; 5 (55.6%) were in the West Bank and 4 (44.4%) in Gaza. The majority were governmental hospitals (n=5, 55.6%). The mean PIPES index was (Personnel = 4.1, Infrastructure = 18.6, Procedures = 10.2, Equipment = 19.7, and Supplies = 22.4). The number of hospital beds, functioning operating rooms, and plastic surgeons (regardless of board-certification status), per 100,000 people were 41.3, 0.9 and 0.4, respectively. There were only 4 board-certified plastic surgeons; only one in Gaza. None of the facilities surveyed had a plastic surgery residency training program. Deficiencies in PIPES were significant as follows: 77.8% of facilities do not perform free flaps (none in Gaza), 55.6% do not perform any microsurgical procedures (none in Gaza), 55.6% lack a system to identify complications, and 55.6% of facilities do not offer regular plastic surgery CME courses to their plastic surgeons. The average hours of electricity per day in Gaza vs West Bank was 8.0 vs 24.0, p=0.02.

**CONCLUSIONS:** Evaluating plastic surgical capacity in Palestine reveals significant deficiencies across all five domains of the modified PIPES tool, most pronounced in Gaza. We hope these results would inform stakeholders about the status of plastic surgery in Palestine to help eliminate surgical care disparities, to build plastic surgical training programs, and to improve access to safe plastic surgical care in the country.

## The Effects of Adipose Derived Stem Cells (ADSCs) on Nerve Regeneration. Functional and Molecular Outcomes in a Peripheral Nerve Injury Experimental Model

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**INTRODUCTION:** Peripheral nerve injuries are one of the most common causes for consultation for reconstructive surgery in the emergency department, they often lead to permanent disability. Once the adult nerve tissue is injured, regeneration has unpredictable results, despite an accurate surgical effort. The interval between nerve injury and surgery is one of the most crucial factors that affect

functional recovery, as long-term delayed nerve repair often results in poor recovery. Amongst the biological markers currently studied in nerve regeneration studies, ATF3 and GAP43 are two of the most relevant. ATF3 is a member of ATF/CREB family of transcription factors, it is induced in a variety of stressed tissue. It has been stated that growth associated protein (GAP43), also known as B50, neuromodulin and F1 play an important role among the proteins involved in the regulation of neurite outgrowth, growth cone guidance and synaptic plasticity (Colocalization and interaction of DPYSL3 and GAP43 in primary cortical neurons). In recent years, several studies involving ADSCs (adipose derived stem cells) have been developed in order to evaluate their potential in nerve regeneration (facial nerve, peripheral nerve, spinal chord injuries, brachial plexus injuries, etc)

**AIM:** To evaluate the potential role of ADSCs on nerve regeneration. To evaluate the expression of molecular markers ATF3 and GAP43 in two different peripheral nerve injury models followed by surgical repair. Determine the molecular changes expressed in the microenvironment of the nerve injury. We hypothesize that ADSCs could have a potential role in nerve regeneration. Fifty five young-adult male Wistar rats (300-350 g) were used in this study. Animals were supplied by the vivarium of the research center and housed in controlled environment (12-12 h light-dark inverted cycle (lights off 10:00 hrs), temperature 22°C). Rats were housed in groups of 4-6 individuals with ad libitum access of food and water, in cages measuring 45x30x30 cm. These experiments followed the general principles of worldwide laboratory animal care (NIH publication 85-23, 1985 as well as the National NOM) and were approved by the local ethics and safety committees. We always make an effort in order to minimize animal suffering and minimize the number of animals and experimental models used during all experimental procedures. We believe that it is of utmost importance to strictly follow International Animal Care and Protection Norms and Principles. We also consider that experimental models worldwide are performed and needed in order to help patients in the future, and improve the quality of care for surgical patients and deliver better outcomes. Injury models include: Chronic Constriction Injury (CCI) Induction, Neurotmesis + Neurorrhaphy. We evaluated: Tactile response threshold, Muscle pressure threshold, Acetone spray test (cold stimulus), Spontaneous ambulatory activity and motor coordination, and expression of ATF3 and GAP43 proteins.

**RESULTS:** MPT decreases were observed in both injured groups versus controls (CCI: 38% and NT+NR: 31%,