Gastric Sleeve Surgery Shifts Immunophenotyping Polarization From M1 To M2 With A Shift From Pro-inflammatory To Anti-inflammatory Pattern In Morbid Obese

Background
Obesity is an inflammatory disease associated with immune cell defects. The objective of this study is to characterize the adipose tissue macrophage (ATM) phenotype and function in human omental adipose tissue and peripheral blood in relation to obesity and its changes after gastric sleeve surgery for weight loss.

Methods and subjects:
Adipose tissue was obtained from morbid obese subjects with BMI > 40 kgm2 subjects undergoing the surgery in the Metabolic/Surgical department at Hammed Medical Hospital (HMC)-Qatar. Metabolic markers were measured in fasting serum and immune blood cells of the peripheral blood and ATMs were characterized by flow cytometry. For immunophenotyping of T-cell populations of CD4+ cells, the circulating CD45+ was counted using (BD LSRFortessa TM Cell Analyzer) and was utilized for WBCs subpopulation. CD4+ T-cell subpopulations were defined as naïve (CD45RA+ and CD27+), central memory T cells (CD45RO+ and CD27+), and effector/peripheral memory (CD45RO+ and CD27-) and natural T-regulatory cell (CD4+CD25+ Fox3+). ATM was analyzed for CD11c and CD206.

Results
The mean and SD age of the study subjects were 31.67 (9.80) years, and females were more frequent 73.3%. Follow up of the study subjects after surgery after 3 month revealed that BMI was significantly reduced by 8%. Counting of the CD4+ T-cell subpopulations by flow cytometry on isolated PMBCs revealed that gastric sleeve significantly reduced the naïve cell number (CD45RA+ and CD27+), central memory T cells (CD45RO+ and CD27+), and effector/peripheral memory (CD45RO+ and CD27-) and natural T-regulatory cell (CD4+CD25+ Fox3+). ATM shows marked distribution of CD11c+ CD206+. Based on the HOMA insulin resistance calculation, 67.0% were insulin resistance (IR) and had higher mean and SD of glucose in mmol/L (6.74 ±0.93) than non-IR subjects (5.58±1.24) with p value=0.106 but had significantly higher mean and SD of insulin level μU/ml in IR subjects (24.75±4.08) than non-IR subjects (13.75±3.77) with p value=0.006. A significant reduction of circulating IL-6 and MCP-1 (markers of M1 polarization) was observed after the intervention by 33% and 13.0% (p=0.021 and p=0.0019), respectively, while IL-10 a marker of M2 polarization significantly increased by 12.0% after surgery with p =0.050.

Conclusion
Weight loss intervention to morbid obese subjects by gastric sleeve with energy restriction was accompanied by a significant change in immunophenotyping polarization from M1 to M2 with a shift from pro-inflammatory to anti-inflammatory pattern.