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Effect of Laparoscopic Sleeve Gastrectomy on Levels of Fractalkine (CX3CL1) in Obesity and Diabetes, 1-Year Follow-up

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Background: Obesity is characterized as an accumulation of adipose tissue mass represented by chronic, low-grade inflammation. Chemokines, as one of the important mediators in immune cell infiltration have been hypothesized to be involved in macrophage infiltration into adipose tissue in obesity and therefore might play an important role in the development of obesity-related disorders like type 2 diabetes. Fractalkine or CX3CL1 is the only member of CX3C chemokine family which can be found in both soluble and in membrane-attached binding molecules. It is considered not only as chemotactic factor which plays a role in immune cells recruitment, but it also recognized as a player in the development of numerous inflammatory conditions including metabolic diseases and type 2 diabetes. However, changes in the circulatory fractalkine levels in morbid obese subjects after bariatric surgery remain unclear.

Aim: Our aim was to investigate the association between circulatory level of fractalkine, obesity and type 2 diabetes before and after Laparoscopic Sleeve Gastrectomy (LSG) at different time points during a one-year follow-up study.

Method: 40 morbidly obese subjects (17 diabetic and 23 non-diabetic) with a BMI ≥ 40 kg/m^2 underwent LSG, while 34 normal weight subjects (19 diabetic and 15 non-diabetic) with a BMI < 25 kg/m^2 were recruited as controls. The circulatory levels of fractalkine (pg/mL) in morbid obese participants (i.e. with and without type 2 diabetes) before and after LSG during different time points of 7, 15, 30, 60, 90, 180 and 360 days postoperatively, were compared with the levels in normal weight participants (i.e. with or without type 2 diabetes). The correlation between levels of this chemokine and other clinical and biochemical parameters was also studied.

Results:

Table 1: Clinical characteristics of study population subjects at baseline.

Variable	Morbid Obese		p-value	Normal Weight		p-value
	Diabetic	Non-diabetic		Diabetic	Non-diabetic	
Age, year	39.88 ±2.4	31.48 ±2.16	**0.013***	50.4 ±2.34	39.87 ±2.9	**0.007****
Weight (kg)	121.0 ±5.24	120.7 ±4.57	0.889	68.22 ±2.54	66.46 ±3.24	0.67
BMI (kg/m^2)	43.78 ±1.5	44.56 ±1.58	0.675	24.17 ±0.36	24.39 ±0.64	0.763
Waist circumference	122.1 ±3.08	119.2 ±2.63	0.568	91.38 ±2.07	81.5 ±2.94	**0.0092****
Waist/Hip	0.938 ±0.02	0.873 ±0.023	**0.049***	0.933 ±0.026	0.81 ±0.029	**0.0052****
TG (mM)	1.74 ±0.22	1.134 ±0.13	**0.011***	1.22 ±0.128	0.692 ±0.094	**0.002****
LDL-C (mM)	3.08 ±0.24	3.1 ±0.12	0.878	2.7 ±0.24	2.77 ±0.214	0.858
HDL-C (mM)	0.944 ±0.048	1.24 ±0.073	**0.004****	1.14 ±0.058	1.57 ±0.118	**0.0018****
FBG (mM)	10.24 ±0.76	5.67 ±0.16	**0.0001****	9.4 ±0.83	5.5 ±0.13	**0.0001****
HbA1c %	8.52 ±0.37	5.82 ±0.10	**0.0001****	8.45 ±0.455	5.5 ±0.12	**0.0001****
Gender (F/M)	13:4	16:7		7:12	8:7	
Fractalkine (pg/mL)	157.62 ±11.20	94.52 ±13.73	**0.027****	145.75 ±20.27	81.92 ±14.66	**0.045***

Baseline data are presented as mean ±SEM, Student t-test was applied to test significance between diabetic and non-diabetic subjects. p≤0.05 was considered significant.

Fig 1: At baseline, the level of fractalkine was significantly ($p<0.0001$) higher in diabetic subjects (n=36, 151.35±11.82) compared to non-diabetic subjects (n= 38, 89.54±10.05). No significant difference was observed between morbid obese (n=40, 121.33±10.39) and normal weight groups (n=34, 117.59±14.00).

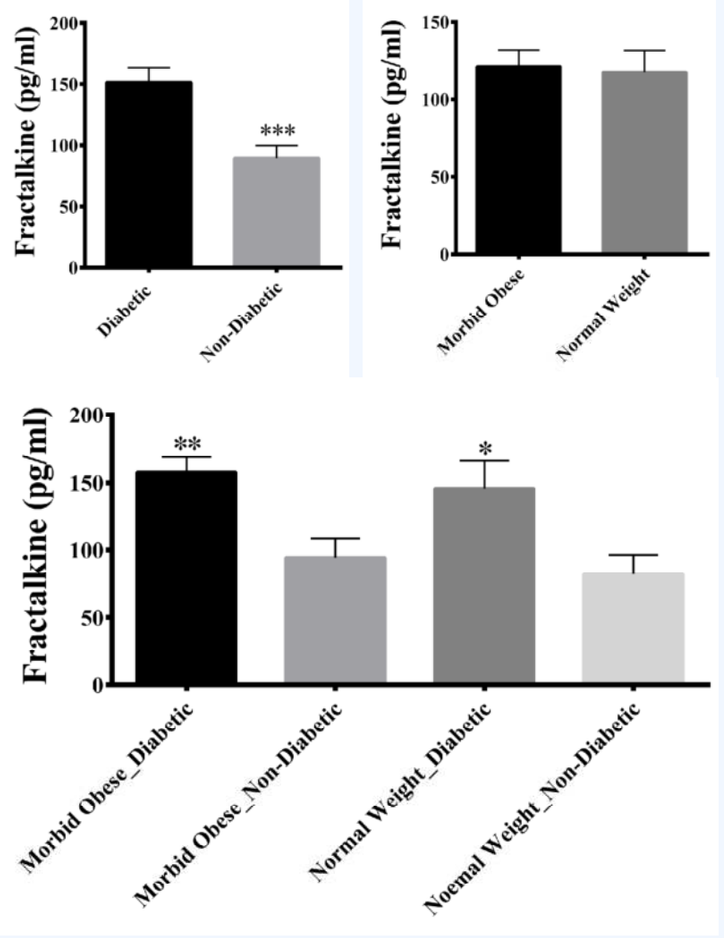

Table 2: Spearman correlation analysis of baseline levels of Fractalkine.

	Diabetic		Non-Diabetic		Morbid Obese		Normal weight	
	r	p value	r	p value	r	p value	r	p value
Body Fat Mass (Kg)	.407*	0.014	0.138	0.408	0.072	0.657	0.040	0.822
Body Fat (%)	.371*	0.026	0.080	0.631	0.071	0.662	-0.046	0.796
VFA (cm2)	.489**	0.002	0.036	0.830	0.113	0.488	0.136	0.442
F-Glu (mmol)	.528**	0.001	-0.090	0.590	.461**	0.003	.473**	0.005
HbA1c (%)	.443**	0.007	-0.055	0.743	.415**	0.008	.561**	0.001

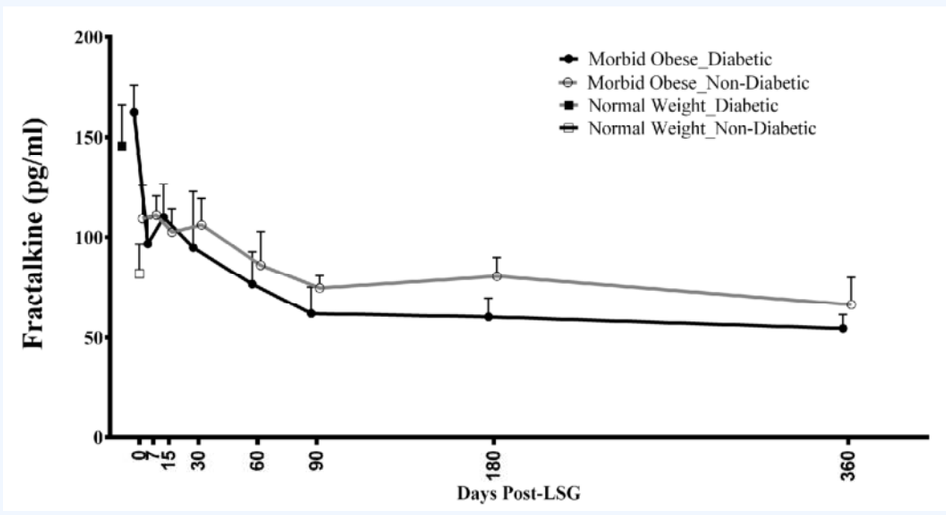

Fig 2: After one year of LSG, the level of fractalkine was significantly ($p<0.0001$) reduced in morbid obese diabetic subjects (n=11, 54.54±6.82), reaching a level that is comparable to normal weight non-diabetic participants (n=15, 81.92±14.66).

Conclusion: In our study, fractalkine levels were decreased after LSG in morbid obese diabetic subject. These changes were associated with improvement in insulin sensitivity, since a remission of type 2 diabetes was found in morbid obese diabetic group after LSG.

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