Results

RESULTS

This study was conducted on thirty patients presented to the out patient E.N.T clinic of Benha University Hospital with bilateral persistent nasal obstruction of varying duration from 1 year to 10 years. .

A- Preoperative results

Twenty-three patients were males (76.7 %) and seven were females (23.3%). The mean age ± SD of the patients was 21.3 ± 3.4 years. The mean ± SD of nasal obstruction in years was 5.1 ± 2.7 years (Table 1).

Pre-operative saccharine test was done to all patients. All patients showed prolonged time ranging from 16 minutes to over 30 minutes with a mean duration ± SD 21.7 ± 4.9 minutes (Table2).

Table (1) Characteristic features of the study group

Males		Females		$\bar{x}$ ± SD of age (years)	$\bar{x}$ ± SD of nasal Obstruction. (years)
No.	%	No.	%	21.3 ± 3.4	5.1 ± 2.7
23	76.7	7	23.3		

Table (2) Preoperative saccharine test duration

Duration	Minutes
Maximum duration	32
Minimum duration	16
Mean duration	21.7

B) Postoperative clinical results

After one month with regular weekly follow up 5 patients were missed as they did not attend the last follow up visit.

The results were recorded as the following :

In the early postoperative period, 10% (3 patients) of the right side turbinate (coblation side) were complicated by minor bleeding in the first 6 hours. This bleeding was controlled by ephedrine packs. In the left side (electrical diathermy side) 16.6% (5 patients) showed minor bleeding in the first 6 hours which was also controlled by ephedrine packs (table 3).

According to 100 visual analogue scale (VAS) the results for postoperative pain, obstruction and crusting were:

Pain: it was only recorded in the first day of follow up with no significant difference between coblation and diathermy sides (table 4).

For the coblation side; in the first week *nasal obstruction* scores were; 15 patients giving the score of 50 and 15 patients giving the score of 25. After one week 1 patient gave the score of 50, 15 gave the score of 25 and 14 gave the score of 0. After 2 weeks 5 patients gave the score of 25 and 25 gave the score of 0. In the last follow-up visit (after one month) 6 patients gave the score of 25, 19 gave the score of 0 and 5 were missed.

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Regarding *nasal crusting* in the first week the scores were; 6 patients gave the score of 25 and 24 gave the score of 0. After one week 7 patients gave the score of 25 and 23 gave the score of 0.After 2 weeks 4 patients gave the score of 25 and 25 gave the score of 0.In the last follow-up visit 25 patients gave the score of 0 and 5 patients were missed.

For the diathermy side; in the first week *nasal obstruction* scores were; 5 patients giving the score of 100, 9 giving the score of 75 and 16 giving the score of 50. After one week 4 patients gave the score of 100, 2 gave the score of 75, 5 gave the score of 50 and 19 gave the score of 25. After two weeks 2 patients gave the score of 50, 14 gave the score of 25 and 14 gave the score of 0. In the last follow-up visit (after one month) 10 patients gave the score of 25, 15 gave the score of 0 and 5 were missed.

Regarding *nasal crusting* in the first week the scores were; 3 patients gave the score of 50, 15 gave the score of 25 and 12 gave the score of 0.After one week 12 patients gave the score of 50, 12 gave the score of 25 and 6 gave the score of 0.After 2 weeks 2

There was significant difference in *nasal obstruction* in the benefit of Coblation side in the first week ($p < 0.001$), after one week($p<0.001$) and after two weeks($p<0.01$) but no significant difference after one month ($p>0.05$) (Table 5).

Nasal crusting was more in the diathermy side during the whole postoperative period of the follow up visits with highly significant difference between it and the coblation side (first week; $p<0.01$, after one week; $p<0.001$, after two weeks; $p<0.001$and after one month; $p<0.01$)(Table 6).

There was increase in the duration of **the saccharine test** after one week post operatively with no significant difference between both sides ($p>0.05$). However there was decrease in the duration of saccharine test after two weeks and one month with significant difference between the coblation and diathermy side in benefit of the coblation side ($p<0.01$, $p<0.001$ respectively)(Table 8).

Table (3) minor bleeding within 6 hours postoperative in the right and left side.

Post operative hemorrhage in the first 6 hours	Right side (reduced turbinate by Coblation)	Left side (reduced turbinate by Submucous electrical diathermy)
Number of patients	4 (13%)	5 (16%)

Table (4) Comparison between $\bar{x} \pm SD$ of postoperative pain according to VAS in RT and LT side.

Post operative / Pain	One day	1 week	2 weeks	1 month	paired "t"	P
1 – Rt side	30	30	30	25	$t_1 = 29.62$	< 0.001
$\bar{x} \pm SD$	55 ± 10.2	0.0	0.0	0.0	$t_2 = 29.62$	< 0.001
$\bar{x}$ of difference	10	55 ± 10.2	55 ± 10.2	55 ± 10.2	$t_3 = 29.62$	< 0.001
S E	2.6	1.86	1.86	1.86		
2 – Lt side (No.)	30	30	30	25		
$\bar{x} \pm SD$	45 ± 10.2	0.0	0.0	0.0	$t_1 = 24.23$	< 0.001
$\bar{x}$ of difference	-	45 ± 10.2	45 ± 10.2	45 ± 10.2	$t_2 = 24.23$	< 0.001
S E	-	1.86	1.86	1.86	$t_3 = 24.23$	< 0.001
Student "t"	3.81					
P	< 0.001					

Table (5) Comparison between $\bar{x} \pm SD$ of post operative nasal obstruction according to VAS measures in RT and LT nasal side.

Post operative / Obstruction	First week n=30	1 week n=30	2 weeks n=30	1 month n=25	paired "t"	P
1 – Rt side						
$\bar{x} \pm SD$	39.17 ± 14.2	14.17 ± 14.2	4.17± 9.5	5 ± 10.2	$t_1 = 7.88$	< 0.001
$\bar{x}$ of difference		25 ±17.4	35 ±16.9	34.17 ± 17.8	$t_2 = 11.36$	< 0.001
S E		3.17	3.08	3.28	$t_3 = 10.42$	< 0.001
2 – Lt side (No.)						
$\bar{x} \pm SD$	64.17 ± 21.5	7.5 ± 26.8	15 ± 15.5	8.33 ± 11.99	$t_1 = 4.75$	< 0.001
$\bar{x}$ of difference	-	26.7 ± 30.7	49.2 ± 26.7	55.83 ± 23.4	$t_2 = 10.1$	< 0.001
S E	-	5.6	4.9	4.2	$t_3 = 13.08$	< 0.001
Student "t"	5.32	4.21	3.26	1.06		
P	< 0.001	< 0.001	< 0.01	> 0.05		

Table (6) Comparison between $\bar{x} \pm SD$ of post-operative nasal crusting measures according to VAS in RT and LT side.

Post operative / Crusting	First week N=30	1 week n=30	2 weeks n=30	1 month n=25	paired "t"	P
1 – Rt side						
$\bar{x} \pm SD$	5 ± 10.2	5.83 ± 10.8	3.33 ± 8.6	0.0	$t_1 = 4.06$	> 0.05
$\bar{x}$ of difference	-	0.83 ± 7.9	1.67 ± 6.3	5 ± 10.2	$t_2 = 1.44$	> 0.05
S E	-	1.46	1.16	1.86	$t_3 = 2.7$	< 0.01
2 – Lt side (No.)						
$\bar{x} \pm SD$	17.5 ± 17.6	29.2 ± 18.7	18.33 ± 14.6	16.7 ± 16.5	$t_1 = 3.5$	< 0.01
$\bar{x}$ of difference	-	11.7 ± 18.3	0.83 ± 17.96	0.83 ± 7.99	$t_2 = 0.41$	> 0.01
S E	-	3.33	3.28	1.46	$t_3 = 0.57$	>0.05
Student "t"	3.37	5.93	4.85	3.55		
P	< 0.01	< 0.001	< 0.001	< 0.01		

Table (7) Comparison between X + SD of duration of saccharine test pre & post- Operative in Rt and Lt side

Time / Duration Of Saccharin test	Pre-operative	Post operative			paired "t"	P
		1 week	2 weeks	1 month		
1 – Rt side (No.)	30	30	30	25	$t_1 = 5.46$	< 0.001
$\bar{x}$ ± SD	21.7 ± 4.9	26.4 ± 15.57	18.8 ± 4.6	9.83 ± 4.6	$t_2 = 3.25$	< 0.001
$\bar{x}$ of difference	-	4.7 ± 4.6	2.93 ± 4.94	11.9 ± 5.8	$t_3 = 11.28$	< 0.001
S E	-	0.85	0.9	1.06		
2 – Lt side (No.)	30	30	30	25		
$\bar{x}$ ± SD	21.7 ± 4.9	29.93 ± 4.83	21.2 ± 2.6	14.5 ± 3.6	$t_1 = 8.98$	< 0.01
$\bar{x}$ of difference	-	8.2 ± 4.99	0.53 ± 4.7	7.2 ± 7.1	$t_2 = 0.63$	> 0.05
S E	-	0.91	0.85	1.28	$t_3 = 5.63$	< 0.001
Student "t"		2.62	3.36	3.99		
P		>0.05	< 0.01	<0.001		

t_1 = Pre vs Post 1 week t_2 = Pre vs Post 2 weeks t_3 Pre vs Post 1m

C- Ultrastructural results

The electron microscopic examination of the specimens taken from the right inferior turbinate in which coblation was used showed:

* ***Ciliated cells*** **:** In all specimens did not show any cilia in the epithelial cells by low power magnification of the electron microscope (figure 19). However by the high power magnification short cilia and apical secretory granules were present in the epithelial cells (figure 22). Also, some epithelial cells showed moderate damage; moderate loss of cell junctions with some ulceration in the surface was also seen. Few apoptotic cells are seen (figure 20).

* ***Goblet cells:*** Few non-functioning goblet cells were seen in the epithelium by the low and high power magnification (figure 19).

* ***Intermediate cells*** **:** Showed to some extent intact cell junctions and no intracellular oedema. Few cells showed apoptosis (figure 21).

* ***Basal cells*** **:** Few apoptotic cells were seen, most of cells were attached to the basal lamina.

* ***Subepithelial layer*** **:** Showed few inflammatory cells and few intracellular oedema.

The electron microscopic examination of the specimens taken from the left inferior turbinate in which diathermy was used showed:

* ***Ciliated cells:*** In all specimens there were no any cilia in the epithelial cells by low or high power magnification of electron microscope some cells were covered only by branched microvilli. Many of the cells showing apoptosis (figure 16), most cell junctions were lost and there was marked oedema in between the cells. Few cells were still reaching basal membrane (Figure 16, 13).

* ***Goblet cells:*** No goblet cells were found in any of the specimens collected from patients from left side by high or low power magnification of electron microscope.

* ***Intermediate cells:*** Many of the intermediate cells showed apoptosis, loss of intercellular junctions, few attached to the basal lamina and marked intracellular oedema in between the cells (figure 13).

* ***Basal cells:*** Many cells showed apoptosis and few were attached to the basal lamina.

* ***Subepithelial layer:*** Showing multiple inflammatory cells (lymphocytes, eosinophilis and macrophages), fibroblasts, collagen bundles and marked oedema. (figure 18) . Some blood capillaries showed active platelets thrombosis (figure 19). And some submucous glands showing red blood cells in their lumen (figure 18).

Right side (Coblation side)		Left side (diathermy side)
	Ciliated cells	*Ciliated cells*
Cilia	Apparent only with high power as few short cilia	Not detected by high or low power
Cell junctions	Moderate loss of cell junctions	Severe loss of cell junctions
Intracellular oedema	Not significant	Marked
Apoptosis	Few cells	Many cells

Table (8) Comparison between ultrastructural results of biopsy taken from the inferior turbinates (Rt. & Lt.), after reduction by Coblation and diathermy regarding ciliated cells.

Right side (Coblation side)		Left side (diathermy side)
	Intermediate cells	*Intermediate cells*
Cell junctions	Moderate loss of cell junctions	Severe loss of cell junctions
Intracellular oedema	Not significant	Marked
Apoptosis	Few cells	Many cells

Table (9) Comparison between ultrastructural results of biopsy taken from the inferior turbinates (Rt. & Lt.), after reduction by Coblation and diathermy regarding Intermediate cells cells.

Right side (Coblation side)		Left side (diathermy side)
	Basal cells	*Basal cells*
Cell junctions	Moderate loss of cell junctions	Severe loss of cell junctions
Intracellular oedema	Not significant	Marked
Apoptosis	Few cells	Many cells
Attachment to basal lamina	Mostly attached	Few are still attached

Table (10) Comparison between ultrastructural results of biopsy taken from the inferior turbinates (Rt. & Lt.), after reduction by Coblation and diathermy regarding basal cells.

Right side (Coblation side)		Left side (diathermy side)
	Subepithelial layer	*Subepithelia layer*
Inflammatory cells	Few	Many
Capillary thrombosis	Not detected	Detected
Apoptosis	Few cells	Many cells

Table (11) Comparison between ultrastructural results of biopsy taken from the inferior turbinates (Rt. & Lt.), after reduction by Coblation and diathermy regarding subepithelial layer.

region of nasal mucosa from the left inferior nasal turbinate processed low power 2800.Section showing apical part of mucosa cilia marked intracellular oedema in between intermediate cells (O) and no attachment to the basement membrane (B).

Figure (14): A region of nasal mucosa from the left inferior nasal turbinate processed by scanning electron microscope/low power 2800. Section showing epithelial cells (E)with no cell junctions, no cilia , no Goblet cells and few are attached to the basal lamina (BL).

Figure (15): A high power x 4600 section in a submucosa of the left inferior turbinate showing a platelet thrombus in a capillary.

Figure (16): A region of nasal mucosa from the left inferior nasal turbinate processed by scanning electron microscope/low power 2800. Section showing epithelial cells (E)with no cell junctions, no cilia , no Goblet cells , Apoptosis (APP) and intracellular oedema(O).

Figure (17): A low power x 2800 section of a submucous gland (SGL) showing RBC inside its lumen.

Figure (18): Basal part of figure 11 showing fibroblasts (F), lymphocytes(L), Eosinophils(EO), Collagen bundles (CO), Macrophages(M) and oedema(O).

Figure (19): A region of nasal mucosa from the right inferior nasal turbinate processed by scanning electron microscope/ low power x 2800. Section showing superficial epithelial cells(E) with no apparent cilia, apparent non-functioning Goblet cells(G). Lymphocytes are also present in this section (L).

Figure (21): A region of nasal mucosa from the right inferior nasal turbinate processed by scanning electron microscope/high power x 3600. Section showing intermediate epithelial cells(I) with intact cell junctions(J) with no intracellular oedema and normal cytoplasmic organelles. Some cells showing apoptosis (APP).

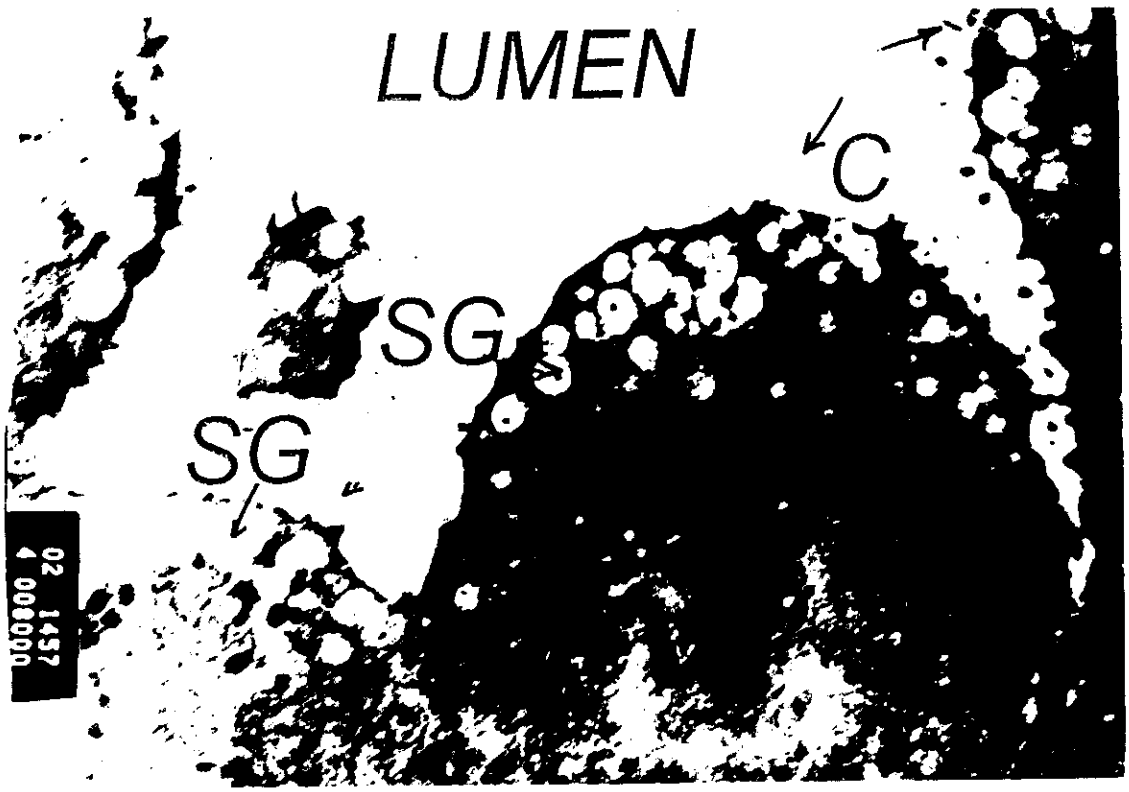

Figure (22): A region of nasal mucosa from the right inferior nasal turbinate processed by scanning electron microscope/high power x 8000. Section showing epithelial cells with short cilia(C) with apical submucus granules (SG).