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Clinical Outcome of Gynaecomastia Surgery Cases—An Eight-Years Retrospective Study

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Abstract

Objectives: Gynecomastia is a diffuse benign enlargement of the male breast. Its incidence has been increasing recently, especially among young males. This study aims to analyze the outcome of the gynecomastia cases operated at a tertiary care center and assess its clinical correlation. **Patients and Methods**: The medical records of patients operated on for 8 years (between January 2015 and December 2022) at the Plastic Surgery Department, were reviewed. This 8-year retrospective study analyzed the demographic data, the history and clinical picture of the gynecomastia presentation, and the surgeries performed with the postoperative complications. **Results**: A total of 196 patients were included in the study. The mean age was 31.2 years (16 - 51 years). The mean duration of gynecomastia was 4.9 years (2 months - 37 years). 59 patients had primary gynecomastia since puberty (30.1%), while 137 patients had secondary gynecomastia (69.9%). 101 of the patients had a history of hormonal injections (51.5%), while 95 patients denied receiving these injections (48.5%). 97 cases had 2ry gynaecomastia and received hormonal injections (70.8% of the 2ry gynaecomastia cases). 130 cases complained of swelling of the breasts and 114 complained of tenderness. Bilateral gynaecomastia was found in 169 cases (86.2%) and unilateral in the rest 27 cases (13.8%). 20 cases underwent liposuction surgery, 36 cases had retroareolar discs excision, 105 cases had liposuction with retroareolar discs excision, 8 cases had Doughnut procedure while 15 cases had both doughnut and liposuction done. Mastectomy with nipple areolae graft was done in 10 cases. 32 patients (16.16%) had postoperative complications in the form of early complications of haematoma in 6 cases and seroma in 2 cases. Delayed complications included recurrence in 17 cases and hypertrophic scars in 4 cases while 2 patients complained of asymmetry and one patient had chronic left axillary nerve irritation. **Conclusion**: The incidence of gynecomastia increases with hormonal and protein intake. The in-

cidence of postoperative complications had no significant relation to the type of surgery performed in our cases.

Keywords

Gynecomastia, Surgical Treatment, Postoperative Complications, Hormonal Factors, Clinical Outcomes

1. Introduction

Gynaecomastia is defined as a benign female-like enlargement of the male breast resulting from an increase in ductal tissue, stroma and/or fat [1].

The pathophysiological mechanisms that can lead to gynaecomastia can be either an increase of estrogens, a decrease of androgens, an altered serum androgen to estrogen ratio or androgen receptor defects [2]. Many classifications are described to grade the level of gynecomastia clinically. One of the most commonly used classifications is that made by Simon who classified gynaecomastia into three grades according to the breast size enlargement and the presence or absence of excess skin. In grade I, there is a small visible breast enlargement with no excess skin. Grade II was further subdivided into A and B according to the skin situation where grade IIA had moderate breast enlargement without excess skin while grade IIB had moderate breast enlargement with excess skin. Grade III is a situation in which there is severe breast enlargement with marked skin redundancy (pendulous female breast) [3]. We used this classification in our study.

The main objective of our study was to document the sociodemographic profile of patients presenting with gynecomastia and their subsequent surgical outcomes at a tertiary care hospital, Abu Dhabi, United Arab Emirates over 8 years.

2. Patients and Methods

This is an 8-year retrospective study of patients who underwent gynecomastia surgery at Zayed Military Hospital, a tertiary care center, Abu Dhabi, United Arab Emirates from the period of the beginning of January 2015 till the end of December 2022. The medical records were reviewed and the data were analyzed.

The collected data included demographic data such as age, weight, and body mass index (BMI). Data from history including duration of having the gyanaecomastia, hormonal and protein intake, previous gynaecomastia surgery and smoking were included in the analysis. Clinical examination of the presence of swelling or tenderness bilaterally or unilaterally and the grade of gynaecomastia according to Simon's classification was assessed. The type of surgery performed, the duration of hospital stay and the development of postoperative complications were also noted in the study.

3. Statistical Analysis

The study employed a chi-square test of independence to investigate the distinc-

tion between different types of gynecomastia and the relationship between the kind of operation performed, and the frequency of postoperative complications.

4. Results

A total of 196 patients underwent gynaecomastia surgery during the period from the beginning of January 2015 till the end of December 2022. These patients were referred from either the Family Medicine clinic or from the Endocrinology clinic to the Plastic Surgery Clinic at Zayed Military Hospital.

The mean age of the patients included in the study was 31.2 years (16 - 51 years). The mean weight of the patients was 88.8 Kg (49 - 120 Kg) and the mean BMI was 27.4 kg/m^2 (16 - 39 Kg/m^2).

The mean duration of having gynecomastia was 4.9 years (2 months - 37 years). 59 patients had primary gynecomastia since puberty (30.1%), while 137 patients had secondary gynecomastia (69.9%) (Figure 1). One hundred and one patients had history of hormonal injections (51.5%) while 95 patients denied ever having these injections as per records (48.5%). 97 of those with secondary gynecomastia had received hormonal injections (70.8% of the secondary gynecomastia). Only 4 patients of the primary gynecomastia cases had received hormonal injections. One hundred and thirteen patients (57.7%) had history of protein tablets intake while eighty three had no history of protein tablets intake (42.3%). 105 patients with 2ry gynecomastia had history of protein tablets intake (76.6% of the 2ry gynaecomastia cases).

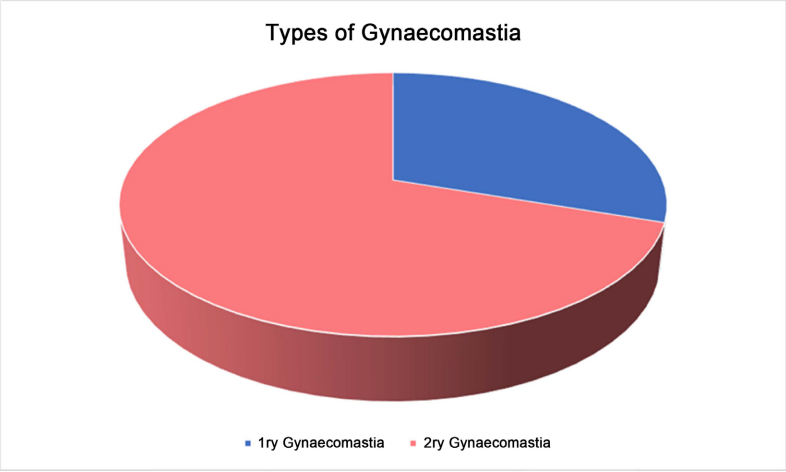

Figure 1. The percentage of 1ry and 2ry gynaecomastia to each other in the study.

The highest incidence of gynaecomastia was found in the patients of age group of 30 - 39 years (83 cases) followed by the age group between 20 - 29 years (75 cases). These were the patients with the highest incidence of history of hormonal and proteins intake. The lowest incidence of presence of gynaecomastia in our study was found in the age group of 50 - 59 years (2 cases with no history of hormonal or protein intake) (Table 1).

Table 1. Relation of different ranges of age groups to the type of gynecomastia and hormonal and protein intake.

Age Range	No. of Cases	1ry gyn.	2ry gyn.	Hormones	Proteins
10 - 19 years	9	7	2	0	1
20 - 29 years	75	18	57	49	55
30 - 39 years	83	26	57	45	50
40 - 49 years	27	6	21	7	7
50 - 59 years	2	2	0	0	0
	196	59	137	101	113

Younger age groups used much more protein supplements than older age groups, especially individuals in 30 - 39 (49.4%) and 20 - 29 (69.3%) years of age. According to the Chi-Square test, there is a statistically significant correlation (p-value = 0.000) between the usage of protein supplements and age. This suggests that younger persons are more likely to use supplements, perhaps as a result of fitness or health-related objectives. The findings show that the age group of 20 to 39 years old has the highest frequency of protein consumption, whereas the age group of 40 years and older has limited or no intake.

Crosstab

Count

		Protein supp		Total
		No	Yes	
Age	20 - 29 years	20	52	75
	30 - 39 years	33	41	83
	less than 20 years	8	1	9
	40 - 49 years	20	7	27
	50 years and above	2	0	2
Total		83	101	196

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	34.982[a]	8	0.000
Likelihood Ratio	37.451	8	0.000
N of Valid Cases	196		

[a]. 8 cells (53.3%) have expected count less than 5. The minimum expected count is 0.12.

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	0.422	0.000
	Cramer's V	0.299	0.000
	Contingency Coefficient	0.389	0.000
Measure of Agreement	Kappa	.[c]	
N of Valid Cases		196	

[c]. Kappa statistic cannot be computed. It requires a two-way table in which the variables are of the same type.

The Chi-square test indicates a significant correlation between the use of "Protein Supplement" and "Type" (1ry, 1ry/2ry, and 2ry). Individuals who fall into distinct "Type" groups prefer to consume protein supplements differently or not at all.

Crosstab					
Count					
			Protein supp		Total
			No	Yes	
Type	1ry	1	51	7	59
	1ry/2ry	0	0	1	1
	2ry	11	32	94	137
Total		12	83	102	197

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	68.255[a]	4	0.000
Likelihood Ratio	72.687	4	0.000
N of Valid Cases	197		

[a]. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .06.

There is a discernible correlation between the occurrence of gynecomastia and the consumption of hormones and proteins. At the 0.05 level, the Pearson Chi-Square test ($p = 0.029$) indicates that there is statistically significant correlation.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	87.121[a]	64	0.029

Continued

Likelihood Ratio	90.792	64	0.015
N of Valid Cases	196		

[a]. 88 cells (88.9%) have expected count less than 5. The minimum expected count is 0.06.

One hundred patients were smokers while the remaining 96 cases were not.

Fourteen patients of those included in the study had a history of previous gynecomastia surgery, while 182 patients underwent gynecomastia surgery for the first time.

The main presenting complaints of the patients were swelling in (130), and tenderness (114). The gynaecomastia was bilateral in 169 (86.2%) and unilateral in 27 (13.8%). The bilateral gynaecomastia were symmetrical in 162 and asymmetrical in 7 cases with one side bigger than the other. The unilateral gynaecomastia were more on the left side (21 cases) than on the right side (6 cases).

According to Simon's classification, 31 patients were grade I, 89 patients were grade IIA, 46 patients were grade IIB and 23 patients were grade III. Seven patients had bilateral asymmetric gynaecomastia; 2 patients had grade I on the right side and grade IIB on the left side, 2 patients had grade IIB on the right side and IIA on the left side, one patient had grade I on the right side and grade IIA on the left side, one patient had grade IIA on the right side and grade I on the left side and one patient had grade IIA on the right side and IIB on the left side.

Regarding the incidence of bilateral and unilateral gynecomastia, our results showed no statistically significant correlation between the two ($p = 0.393$). Table 2 demonstrates the distribution of the sides and grades of gynaecomastia and Table 3 demonstrates the grades in the asymmetric bilateral gynaecomastia.

Table 2. Gynecomastia sides and grades.

Grade	Bilateral 169		Unilateral 27		Total
	Symmetrical	Asymmetrical	Right	Left	
I	19		2	10	31
IIA	76		3	10	89
IIB	44		1	1	46
III	23		0	0	23
Total	162	7	6	21	

The study employed a chi-square test of independence to investigate the distinction between the incidence of bilateral and unilateral gynecomastia. χ^2 χ^2 (10, $N = 196$) = 10.559, $p = 0.393$, showed no statistically significant correlation between the two situations. Weak effect sizes were also suggested by symmetric metrics like Phi (0.232) and Cramer's V (0.164), and the corresponding p-value stayed non-significant at.393. These results imply that the incidence of gynecomastia in

the sample as a whole, whether bilateral or unilateral, does not differ statistically significantly.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.559[a]	10	0.393
Likelihood Ratio	8.550	10	0.575
N of Valid Cases	196		

[a]. 13 cells (72.2%) have expected count less than 5. The minimum expected count is 0.12.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	0.232	0.393
	Cramer's V	0.164	0.393
	Contingency Coefficient	0.226	0.393
Measure of Agreement	Kappa	.[c]	
N of Valid Cases		196	

[c]. Kappa statistic cannot be computed. It requires a two-way table in which the variables are of the same type.

Table 3. The grades of the asymmetric bilateral gynecomastia.

Bilateral Asymmetric Cases	Right	Left
Case 1	I	IIA
Case 2	I	IIB
Case 3	1	IIB
Case 4	IIA	I
Case 5	IIA	IIB
Case 6	IIB	IIA
Case 7	IIB	IIA

The surgical procedures performed were in the form of liposuction in 20 cases (10.21%), retroareolar disc excision in 36 cases (18.37%), liposuction with retroareolar disc excision in 105 cases (53.57%), Doughnut procedure in 8 cases (4.08%), Doughnut procedure with liposuction in 15 cases (7.65%) and mastectomy with nipple areaolae graft in 10 cases (5.10%). Two other cases underwent other procedures were; one case of right doughnut procedure and left liposuction with left retroareolar disc excision. The other case required only excision of an ellipse bilaterally of the inframammary redundant folds in a case of post massive

weight loss. Table 4 and Figure 2 demonstrate the number and percentage of the procedures to each other. Figures 3-8 demonstrate examples of different types of procedures performed.

Table 4. The number of procedures performed and their percentage to each other.

Procedure Performed	No.	Percentage
Liposuction	20	10.21%
Retroareolar Disc Excision	36	18.37%
Liposuction with Retroareolar Disc Excision	105	53.57%
Doughnut Procedure	8	4.08%
Doughtnut Procedure with Liposuction	15	7.65%
Mastectomy with nipple areolae graft	10	5.10%
Other Procedures	2	1.02%
Total	196	100%

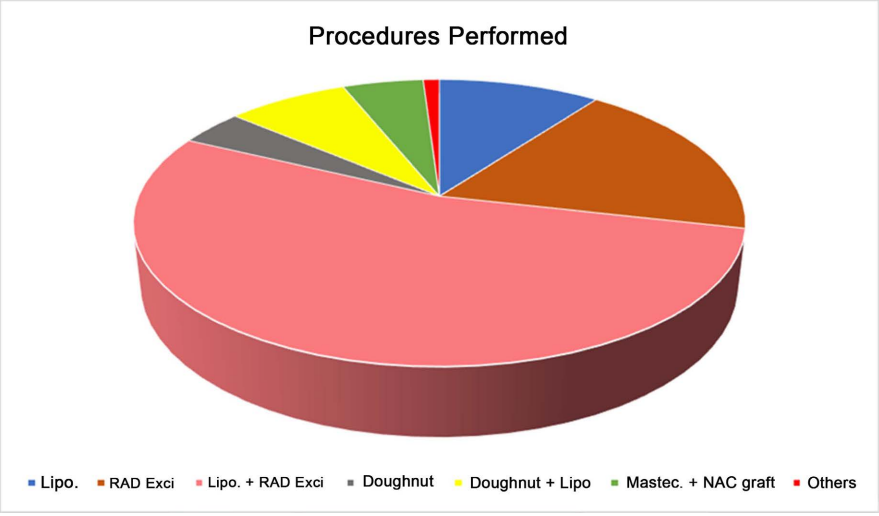

Figure 2. Lipo: Liposuction. RAD Exci: Retroareolar Disc Excision Lipo + RAD Exci: Liposuction and Retroareolar Disc Excision Doughnut + Lipo: Doughnut and Liposuction Mastec. + NAC graft: Mastectomy and Nipple Areolae Complex graft.

Figure 3. Bilateral grade IIA gynaecomastia managed with liposuction only. Pre- and Post-operative photos.

Figure 4. Bilateral grade I gynaecomastia managed with retroareolar discs excision.

Figure 5. Bilateral grade IIA gynaecomastia managed with retroareolar discs excision. The whole gynaecomastia tissue was solely retroareolar discs with no fatty tissue aspiration.

Figure 6. Bilateral grade IIA gynaecomastia managed with liposuction breasts with retroareolar discs excision.

Figure 7. Bilateral grade IIB gynaecomastia managed with liposuction breasts with doughnut procedure.

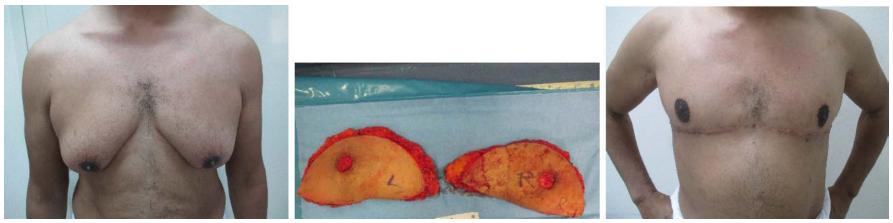

Figure 8. Bilateral grade III gynaecomastia managed with mastectomy and nipple areolae complexes graft

The mean hospital Stay was 2.8 days (1 - 10 days) and the mean follow up period was 143.7 days. One patient stayed for 10 days had a haematoma which was evacuated surgically.

The haematoma was one of the complications found in 6 cases in the study and required surgical evacuation (3.03% of the total number of patients) but the commonest complication was recurrence which occurred in 17 cases (8.59%). Four patients developed hypertrophic scars postoperatively (2.02%), 2 patients had seromas which were aspirated in the outpatient clinic (1.01%) and another 2 patients complained of asymmetry of the sizes of the breasts postoperatively (1.01%). One patient complained of chronic left axillary nerve irritation and was referred to the Pain Clinic and received corticosteroid medication. The sum of the complications was 32 (16.16% of the total number of the patients). Table 5 and Figure 9 demonstrate the postoperative complications and their percentage. Table 6 represents the relation of each type of the surgical procedures to the complications and their incidence in each procedure.

Table 5. Postoperative complications and their percentage to the total number of patients.

Complications	No. of Cases	Percentage
Recurrence	17	8.59%
Haematoma	6	3.03%
Hypertrophic Scar	4	2.02%
Seroma	2	1.01%
Asymmetry with Deformity	2	1.01%
Chronic Nerve Irritation	1	0.50%
Total	32	16.16%

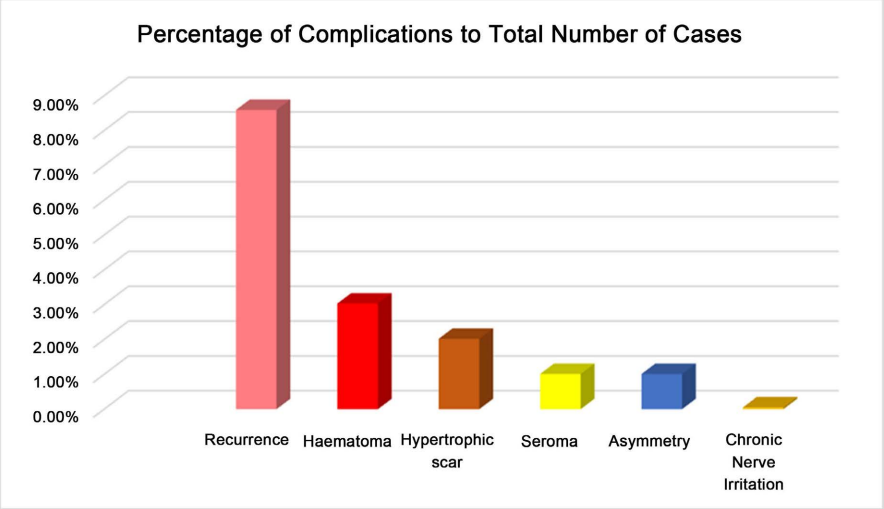

Figure 9. Percentage of complications to the total number of cases.

Table 6. Relation of the type of surgical procedure to the complications and their incidence in each procedure.

Procedure Performed	No.	Perc.	Rec	Haem	Sc	Sero	Asy.	N. Irri.	Tot Com	Perc/ Proce
Lipo	20	10.21%	3						3	15%
RAD Exc.	36	18.37%	2	1					3	8.3%

Continued

Lipo with RAD Exc.	105	53.57%	10	3				1	14	13.3%
Dough. Pro.	8	4.08%	1	1		1			3	37.5%
Dough. + Lipo.	15	7.65%	1	1	1	1	2		6	40%
Mastec. with NAC graft	10	5.10%			3				3	30%
Other Procedures	2	1.02%							0	0%
Total	196	100%	17	6	4	2	2	1	32	

No.: Number. Perc.: Percentage. Rec.: Recurrence. Haem: haematoma. Sc.: Hypertrophic scar. Sero: Seroma. Asy.: Asymmetry. N. Irri.: Nerve Irritation. Tot. Comp.: Total Complications. Perc/Proce: Percentage per Procedure. Lipo.: Liposuction. RAD Exc.: Rtroareolar Disc Excision. Dough. Pro.: Doughnut Procedure. Mastec. With NAC graft: Mastectomy with Nipple Areola Complex Graft.

5. Discussion

In recent years, there has been much interest among young adults going to the gymnasium for power sports and weight training to get anabolic androgenic steroids, gonadotropins, and growth hormones. These are usually in the form of injections or tablets prescribed sometimes by persons of no medical background. In male athletes, these iatrogenic drugs may suppress spermatogenesis and/or induce gynecomastia [4]. In our study more than half of the patients either had a history of hormonal injections or protein tablets intake or both together. More than two-thirds of the patients who had secondary gynecomastia had a history of hormonal injection usage or protein tablet intake. This shows the effect of high usage of these drugs on the increased incidence of the development of gynecomastia in recent years and hence the importance of patient counseling before surgery on supplement use.

Koch T. et.al reviewed the incidence of gynaecomastia in l 17,601 males between the age 0 - 80 years over a period of 20 years study and found that the highest incidence was in the age group of 16 - 20 years of 6.5/10,000 followed by incidence of 4.6/10,000 in males aged 61 to 80 years and of 4.2/10,000 in males aged 21 to 40 with less incidence in the other age groups. They found that the incidence of gynecomastia has dramatically increased over the last 20 years and attributed the increase in the incidence in the young age group to the endogenous or exogenous sex-steroid environment [5]. In our study the highest incidence of gynaecomastia was in the age groups between 20 and 39 years and they had the highest incidence of secondary gynaecomastia. This group of young adults had also the highest incidence of hormonal injections and proteins intake which confirms the effect of these medications on the development of gynaecomastia.

The main complaints of our patients in the study were an increase in the size of the breasts in 130 cases (66.3%) and tenderness in 114 cases (58.2%). This is in agreement with a study done by Costanzo *et al.* on medical records of 237 men aged 18 - 85 years with gynecomastia and found that the most common presenting

complaints were aesthetic concerns (62.8%) and breast pain (51.2%) [6]. Our patients presented with much higher incidence of bilateral gynaecomastia than unilateral gynaecomastia (86.2% and 13.8% respectively). In some other studies unilateral gynaecomastia presented 1/3rd of their patients [7].

There are many surgical techniques and treatment protocols for correcting gynaecomastia in the literature [8]. For Simon grade I who had retroareolar disc felt, we performed retroareolar disc excision through a half circle infraareolar incision at the skin-areola junction of the nipple-areola complex. They represented 18.37% of our gynaecomastia cases. For Simon grade IIA who had excess fat only with no retroareolar disc felt liposuction was done solely through a 5 mm incision at the anterior axillary line bilaterally (10.21% of the cases). The majority of our patients had both procedures combined together by doing liposuction through a 5 mm stab wound at the anterior axillary line and at 6 o'clock at the infraareolar line before extending the later on both sides during the procedure to remove the disc. (53.57%). In cases where we performed liposuction, we used the same anterior axillary line 5 mm incisions as the site of drains extrusion.

In the literature, some studies extruded the drains through the same infraareolar incisions used for the retroareolar disc excision [1]. Trial of liposuction through anterior axillary line incisions with port site nipple sparing mastectomy avoiding incision at the infraareolar site was done by Asal *et al.* on 103 cases of grades I and II gynaecomastia. They used the site of the liposuction wound at the anterior axillary line to grab the retroareolar disc to outside the wound leaving point of traction on the NAC or the skin which are cut with long scissor until all adhesions released and retroareolar disc is excised. They mentioned that the benefit of this technique is to avoid scars on the anterior chest wall. They had 3 cases of haematoma, 3 cases of superficial nipple areolae necrosis, one case of nipple penetration, 12 patients had nipple retraction with deformity and 72 patients had nipple hypothesia [9]. We feel that having a small unapparent scar at the junction of the areola with the skin at the infraareolar line can avoid most of these complications. Yang *et al.* had another technique to avoid scars on the anterior chest wall by dissecting the subcutaneous gland in the upper quadrant of the breast through an axillary incision under endoscopy guidance. They removed the subcutaneous gland in the lower quadrant of the breast through a 3 - 5 mm auxiliary operative hole positioned at the superior lateral margin of the areola. They mentioned that it is a safe procedure but needs a learning curve [10].

Singamsetty *et al.* compared the aesthetic outcome of the conventional liposuction with the cross-chest liposuction in which they used the circum-areolar incision for suctioning of the lateral chest on ipsilateral side and the entire contralateral chest other than its lateral side. They found that there is no statistical difference between both techniques [11]. We feel that involving the sternal area in cross-chest liposuction could represent a more aggressive procedure in terms of morbidity, compared to traditional liposuction, producing a wider undermined area that doesn't need to be treated.

The Doughnut procedure was performed in 4.08% of our patients and Dough-

nut procedure with liposuction was done in 7.65%. These procedures were used for patients mostly of Simon's grade IIB and some patients of grade III. On the contrary, Fayed & Kholosy, who called the doughnut procedure as the round block procedure, used it in 77.1% of their gynaecomastia cases and when they combined it with liposuction, they used it in only 8.6% of their cases [12].

Filho *et al.* used the doughnut procedure for all their grade III gynaecomastia cases. They preferred this technique in such severe gynaecomastia cases more than other techniques as they felt that it allows the surgeon to achieve an aesthetic result while avoiding unsightly scars or serious complications [13]. Other techniques used in this grade of gynaecomastia patients are total mastectomy with free nipple areola graft and the flap technique of preservation of the nipple-areola complex on a deepithelialized dermoglandular pedicle [14]. Gusenoff *et al.* tried both techniques and were satisfied more with the aesthetic results of preserving the nipple-areola complex on a dermoglandular pedicle than using the total mastectomy with nipple areola graft technique [15]. On the other hand, Barone *et al.* showed good results with total mastectomy with nipple areola graft when they removed the excess skin in the chest region and in the axilla region as a "fish-shaped" pattern [16]. We used the same technique of total mastectomy with nipple areola graft using the fish-pattern incision in our grade III gynaecomastia cases with good results.

While some studies reported the postoperative complications to be as high as 36% [17], Others, on the contrary, showed incidence of as low as 4.4% [18]. Our study showed that 16.16% of our patients developed complications. This was matching with the results obtained by Tolba and Naser in their study with a complication rate of 13.4% [19].

In a retrospective review study done by Lee *et al.* on 98 patients who underwent reoperation because of unsatisfactory esthetic outcomes, they found that 81 of them had under-correction with residual tissue to be removed while the other 17 patients had overcorrection with excess tissues removed and required fat grafting [20]. Our results also showed that the commonest complication in our patients was recurrence with residual swelling felt in the postoperative period which required reoperation of further removal (8.59% of our total number of patients). The patients who had asymmetry with deformity represented only 1.01% of our cases.

Innocenti *et al.* after dividing patients into 3 groups of liposuction techniques, surgical excision techniques and combined techniques of liposuction and excision found that the combined use of surgical excision and liposuction techniques had reduction in the rate of complications compared to the other techniques [21]. Our study did not show correlation between the incidence of complications and the use of the surgical technique whether it is a combined technique or not. Still further studies are required to prove that.

6. Conclusion

Our results show a significant increase in the incidence of gynaecomastia espe-

cially in middle-aged males with the increase in the intake of hormones and proteins in this category of cases. In our study the incidence of postoperative complications had no significant relation to the type of surgical procedure performed. Still further studies are required to prove these results.

Compliance with Ethical Standards

This study was approved by Abu Dhabi Region Ethics and research Committee, Zayed Military Hospital Abu Dhabi. Reference No. 2023.09.

Surgical consent was obtained from all the patients before surgery. Consents for photography and publication were also signed by all the patients.

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Conflicts of Interest

The authors have no relevant financial or non-financial interests to disclose.

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