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Case Series

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Intra-operative use of arista (microporus polysaccharide haemosphere) in breast surgeries reduces post-operative risk of seroma formation: a case series and literature review

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ABSTRACT

The risk of seroma formation is a very common post-operative complication in breast surgeries like mastectomy, wide local excision, axillary dissection. The use of arista which is microporus polysaccharide haemosphere (MPH) can reduce the risks of seroma post-operatively. A case series study has been planned to be conducted using database of patient underwent breast surgeries requiring intra-operative Arista. Database of single surgeon's 22 patients having breast surgeries in 1 year (2021-2022) were analysed. Out of 22 patients, majority of patients (20 patients) had no seroma with the use of Arista intra-operatively where variables accounted are patients age, type of surgery, amount of arista use, duration of drain, drain out-put, patient's BMI, anticoagulation status, tissue histopathology, formation of seroma. The expected outcome would be use of MPH reduces risks of complications of breast surgeries like seroma and haematoma.

Keywords: Arista, Breast surgery, Seroma, Post-operative complications

INTRODUCTION

The risk of seroma formation is a very common post-operative complication in breast surgeries like mastectomy, wide local excision, axillary dissection. The use of arista which is microporus polysaccharide haemosphere (MPH) can reduce the risks of seroma post-operatively. The particles of MPH form crystallized matrix along with blood products like red blood cell, platelets and protein like fibrinogen and albumin in order to accomplish haemostasis in continued bleeding. Studies also have demonstrated have MPH enhance wound healing by increasing macrophage activities. The study on animal models by Egeli et al demonstrated the efficacy of arista reducing risks of seroma formation.[1] This retrospective study will be analysing patients having breast surgeries in last one year who had arista intra-operatively has reduced risk of seroma formation. The study would be achieved by analysis datasets of patients having breast surgeries based on multiple variables and requiring arista intra-operatively. The outcome of this study would possibly encourage the use of arista in breast surgeries.

A case series has analysed using database of patient underwent breast surgeries requiring intra-operative arista. Database of single surgeon's 22 patients having breast surgeries 1 year (2021-2022) will be analysed where variables accounted are patients age, type of surgery, amount of arista use, duration of drain, drain out-put, patient's BMI, anticoagulation status, tissue histopathology, formation of seroma. Data were collected

from post-operative follow up (inpatient and outpatient) to have detailed information regarding the variables. The patients (6 patients) having BMI >35 and who are on anticoagulation have been excluded in the case series. Drains remained till output was <30ml for 2 days or maximum for 7 days. The expected outcome would be use of MPH reduced risks of complications of breast surgeries like seroma and haematoma.

CASE SERIES

Case 1

A 62 years old female had bilateral nipple sparing mastectomy for left breast cancer ductal carcinoma in situ (DCIS). Intra-operatively 5g arista was used. Histopathology showed normal tissues in right breast; fibrosis, foreign body reaction and fat necrosis in left breast, Bilateral drains remained in-situ for 3 days. There was no seroma formation post-operatively

Case 2

A 67 years old female had hookwire guided wide local excision and two sentinel lymph node biopsy for intra-ductal carcinoma. Intra-operative 5g arista was used. Histopathology showed Grade 2 invasive lobular carcinoma, nil nodal metastasis. There was no seroma formation post-operatively.

Case 3

A 73 years old female had removal of bilateral breast implant and capsulectomy X2 for bilateral breast implant rupture. Intra-operative 5g arista was used. Bilateral drains were placed in-situ for 2 days. Histopathology showed synovial metaplasia with fat necrosis. One drain was placed in-situ for 2 days. There was seroma formation post-operatively which was drained bedside.

Case 4

A 64 years female had right breast hook wire guided wide local excision and sentinel lymph node biopsy. Histopathology showed invasive carcinoma. There was no seroma formation post-operatively.

Case 5

A 73 years old female had right breast hook wire guided wide local excision for right breast lump. Histopathology showed papillary lesion. There was no seroma formation post-operatively.

Case 6

A 42 years old female had left nipple sparing mastectomy and sentinel lymph node biopsy for left breast cancer. Drain remained in-situ for 3 days. Histopathology showed infiltrating carcinoma. There was no seroma formation post-operatively.

Case 7

A 62 years old female had left nipple sparing mastectomy and sentinel lymph node biopsy for left breast ductal carcinoma in-situ. Drain remained in-situ for 3 days. Histopathology showed intermediate grade apocrine ductal carcinoma in-situ. There was no seroma formation post-operatively.

Case 8

A 78 years old female had right breast wide local excision and sentinel node biopsy and mastopexy for right breast lesion at 6 o'clock. Histopathology showed invasive carcinoma. There was seroma formation post-operatively which was drained bedside.

Case 9

A 36 years old female had left breast lumpectomy and sentinel node biopsy for left breast carcinoma with palpable mass. Drain remained in-situ for 2 days. Histopathology showed invasive carcinoma with intermediate to high grade ductal carcinoma in-situ. There was no seroma formation post-operatively.

Case 10

A 70 years old female had right mastectomy and sentinel lymph node biopsy for multifocal lobular cancer not tolerating neo-adjuvant chemotherapy. One drain remained in-situ for 5 days. Histopathology showed invasive lobular carcinoma. There was no seroma formation post-operatively.

Case 11

A 53 years old female had left breast hookwire guided lumpectomy and flap for left breast mass. Drain remained in-situ for 3 days. Histopathology showed grade 2 invasive carcinoma. There was no seroma formation post-operatively.

Case 12

A 73 years old female had hookwire guided wide local excision of left sided breast cancer breast screen detected left sided breast ductal carcinoma in-situ. Drain remained in-situ for 5 days. Histopathology showed high grade ductal carcinoma in-situ. There was no seroma formation post-operatively.

Case 13

A 57 years old female had left sided hookwire guided wide local excision and sentinel lymph node biopsy for screen detected left breast cancer, invasive ductal

carcinoma on biopsy. Histopathology showed invasive ductal carcinoma. There was no seroma formation post-operatively.

Case 14

A 59 years old female had hookwire guided wide local excision ×2 left breast and level I-II axillary dissection for left breast cancer and has been on neo-adjuvant chemotherapy. Drain remained in-situ for 3 days. Histopathology showed grade 1 infiltrating carcinoma. There was no seroma formation post-operatively.

Case 15

A 43 years old female had left sided hookwire guided lumpectomy for radial scar. Histopathology showed benign proliferative breast disease. There was no seroma formation post-operatively.

Case 16

A 64 years old female had bilateral mastectomy and right sided axillary clearance for right sided breast cancer following neo-adjuvant chemotherapy. Drain remained in-situ for 3 days. Histopathology showed residual ductal carcinoma in-situ. There was no seroma formation post-operatively.

DISCUSSION

Database of single surgeon's 22 patients having breast surgeries in 1 year (2021-2022) were analysed. Out of 22 patients, majority of patients (20 patients) had no seroma with the use of arista intra-operatively where variables accounted are patients age, type of surgery, amount of arista use, duration of drain, drain out-put, patient's BMI, anticoagulation status, tissue histopathology, formation of seroma. The expected outcome would be use of MPH reduces risks of complications of breast surgeries like seroma and haematoma.

As breast surgeries create more dead space, the post-operative wound is more vulnerable to develop complications like seroma and haematoma. With the use of haemostatic agent like arista, there has been evidence that the drain duration time is statistically significantly lower which also decreases patients' discomfort and chance of developing wound infection. Therefore, with the use of these agents would eventually prevent further delay to commence patients on required therapy like chemotherapy or radiotherapy.[2] The plant based regenerated oxidized cellulose develops a frame to form natural clot which is effective against gram negative and gram positive organisms. As sometimes, coated MPH can be dislodged with sponge, using patched form of oxidized regenerated cellulose (Nu-Knit) in combination with arista would be more effective to control bleeding increasing gauze-sponge packing effect which both would be completely absorbed within few weeks).[3] Arista is composed of MPH powder of flowable, hydrophilic, dry particles integrated by crosslinking plant-based purified polysaccharide which is generally absorbed in 24-48 hours following application. MPH creates a gelled matrix by concentrating blood proteins on the surface of the particle, red blood cells and platelets acting as a framework concentrating clotting factors and creates stable haemostatic plugs.[4]

In a study of a model of heparinized porcine hepatic abrasion, haemostatic matrix showed superior success in haemostasis, bleeding control and statistically significant less loss of blood.[5] Use of MPH causes less reaction with tissues and less artifact in imaging as it was observed to be removed while surgical field irrigation and therefore was not visualised in histopathologial examination with minimal use and maximal cleaning of residual agents from field.[6]

However, a prospective study showed no difference in the quantity and duration of drain output following use of arista in patients having mastectomy in breast cancer.[7] The use of arista has several benefits of using such as, no interference with imaging due to faster absorption, minimal inflammatory response, contained starch does not demonstrate starch crystallinity, can be used in diffuse surgical bleeding, complete haemostasis is achieved without any haemostasis, able to cover broad surfaces, efficacy and safety have been demonstrated in other surgical specialty including urology, orthopedic surgery, obstetrics and gynaecology. Studies show that MPH reduces operative timing and associated with low rates of complications. Few studies also assessed the clinical benefits including reduced duration of surgery, economic values, decreased need for re-interventions, decreased rate of complications, reduced need for blood transfusions and therefore significantly increasing economic benefits.

The fast absorption of MPH can further increase the economic benefits over the use of other haemostats which is not rapidly absorbed intervening with diagnostic imaging requiring further investigations or medical interventions. As other haemostatic agent like floseal requires preparation before application which is 2-6 minutes, the use of MPH saves time and costs.[8]

The discrepancy between MPH being effective and non-effective could be because studies showing non-effective was analyzed in a small study population. The retrospective study of Shinden et al analyzed a larger study population including 325 patients demonstrating MPH effectiveness in breast cancer surgeries. This study subdivided study population into 2 groups-patients with and without axillary lymph node biopsy. In both study groups, MPH has reduced drain output and drain duration. MPH are local haemostatic agents which are particles of hydrophilic polysaccharide made from 100% purified potato starch as advanced bioengineering product. By extracting fluid from blood, MPH swell

forming gelatinous matrix concentrating albumin, platelets, fibrinogen and serum proteins creating framework for fibrin clot formation. MPH creates biocompatible ultra-hydrophilic particle by cross linking with plant based polymer. By absorbing liquid portion of blood, MPH accelerates coagulation cascade by increasing coagulation factors and platelets concentration providing broad area of coverage.[9]

In a study of 12 patients receiving arista powder and transposition of tissue flaps, there was 100% prevention of seroma formation with combined use of arista and haemostatic flaps.[10] In a retrospective study of 131 patients undergoing unilateral mastectomy without reconstruction over 2 years, 119 patients received mucopolysaccharide particles and 71 patients did not receive. Study suggested to consider to use mucopolysaccharide particles in the patients who are at higher risk of developing seroma like patients with diabetes, low albumin level, patients having axillary surgery including lympho-venous anastomosis.[11]

In a study, results showed that arista is effective in patients having vascular surgery as closure systems which is also a beneficial device for sealing sites of lesion eventually helping with controlling bleeding at arteriolar, capillary and venous levels.[12] An animal study showed that composite of positively charged functional groups and water absorbing compounds directed to elementary development in physico-chemical characteristics involving absorption of water, swelling properties, RBC and platelet adhesion due to enhanced hydrophilic and electrostatic properties. This composite is proven to be biocompatible and biodegradable.[13]

CONCLUSION

With the use of arista in breast surgeries, post-operative complications like seroma formation could be reduced. MPH also decreases duration of surgery, need for re-interventions, rate of complications, need for blood transfusions and therefore significantly increasing economic benefits.

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