Frequency and Mechanisms of Breast Tissue Marker Clips and Novel Localisation Devices Migration after **Image-guided Deployment: A 6.5-year Experience**

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Objective To evaluate the frequency and causes of migration of marker clips and novel localisation devices between 1 January 2014 and 30 June 2020 and discuss the preventive measures.

- Retrospectively reviewed patients who underwent marker clips, Magseeds or SaviScouts placement by stereotactic, ultrasound (US) or magnetic resonance imaging (MRI) guidance.
- <u>Methods</u> Mammograms (MMG), stereotactic images, US and MRI were reviewed to identify any device migration ≥ 1 cm and its causes.

Results	Markers / Devices	Modalities	Migration/ Rotation
	176 Markers	 65 US 21 VAB 3 Core Biopsy 41 Pre-chemotherapy 	No migration
		 108 Stereotactic 96 VAB 12 Core Biopsy 	15 Migrations (15.6%) 1 Migration (8.3%)
		3 MRI VAB	No migration
	34 Novel Localisation Devices	23 Magseeds7 Stereotactic16 US	2 Migrations (28.6%) No migration
		 11 SaviScouts 3 Stereotactic 8 US 	No migration 2 Rotations (66.7%) 3 Rotations (37.5%)
	1 Haematoma (6%) 2 Along Needle Tract (11%) 13 Accordion Effect		Figure 1. Pie chart showing different mechanisms of markers/ devices migration. 14 immediate and 2 late migrations
		(72%)	were encountered.

Different mechanisms of migration

Accordion effect

More migration in fatty breasts and thicker breast as less structural support and more breast tissue to re-expand upon release of the compression force. Compression can be partially released prior to clip deployment to minimize accordion effect.

Haematoma and Migration along Needle Tract

Oozing from biopsy site may cause marker extruding along the needle tract. Hematoma can be aspirated and compression can be applied to achieve haemostasis prior to placing the clip, to facilitate adherence of the clip to adjacent breast tissue.

Late Migration

- Cause is uncertain but delayed accordion effect is possible.
- Other rarer causes
 - Change in the clip site due to tumour shrinkage after neoadjuvant chemotherapy (NAC) and reduction mammaplasty, displacement by another clip and due to air resorption at the biopsy cavity were not encountered in our institution.

Postprocedural lateral and craniocaudal MMG, instead of stereotactic paired images, are advocated to document any immediate migration and set as a baseline to detect any late migration in future if localisation is needed.

The most common cause of migration was accordion effect after stereotactic guided placement. It is crucial to recognize different types of migration and their preventive measures in order to have successful localization of lesions that requires surgical excision.



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Discussion