Wound Closure after mastectomy for advanced breast cancer and implication for adjuvant treatment.

Nicolette Landman

- Developments in management have increased the complexity of planning wound closure after mastectomy for advanced breast cancer

Advanced Breast carcinoma

- T3,4 or N2
  - Mastectomy, ANC, Chemo, RT =/- hormone
  - Consider neoadjuvant for larger tumor to assist with mastectomy

Neoadjuvant chemotherapy

- Myelosuppressive effect
  - WBC nadir 10-14 d post chemo
  - Recovery by D 21
- Delay wound healing
  - N if WBC > 3000/mm3
- Increase susceptibility to infection

Mastectomy with simple closure

Neoadjuvant chemotherapy

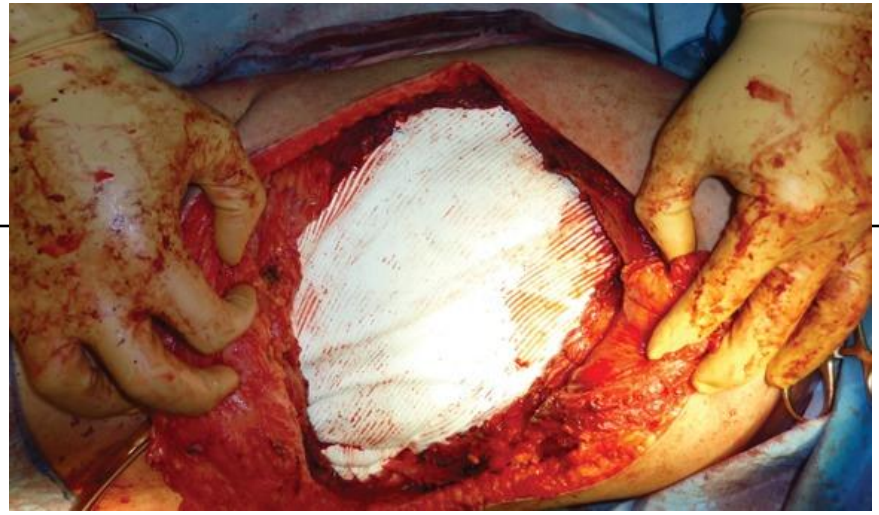
- K Azzawi et al: Neoadjuvant therapy's effect on outcomes of IBR (171 cases)
  - Median interval between cessation of chemo and surgery 37d (aim between 4 – 6 wks)
  - Major complications comparable
  - Minor complications: NA 10%, control 6%
  - Delay to RT comparable 10%
- Forouhi et al no increase in surgery complications (79 cases)
- Deutch et al:immediate TRAM flap safe after NA, but smoking + NA increased complications and delay to adjuvant chemotherapy

Advanced breast Ca

- Post mastectomy
  - Simple closure
  - Chest wall reconstruction
  - SSM + Immediate breast reconstruction

Complex mastectomy defect

- Evaluate:
  - Defect type
  - Pleural cavity status
  - Osseous support requirements
  - Soft tissue available
- Reconstructive options:
  - Latissimus dorsi flap +/- Gore-Tex mesh
  - Thoracoepigastric flap
  - Rectus abdominis flap with vertical / transverse skin island
  - Omental flap



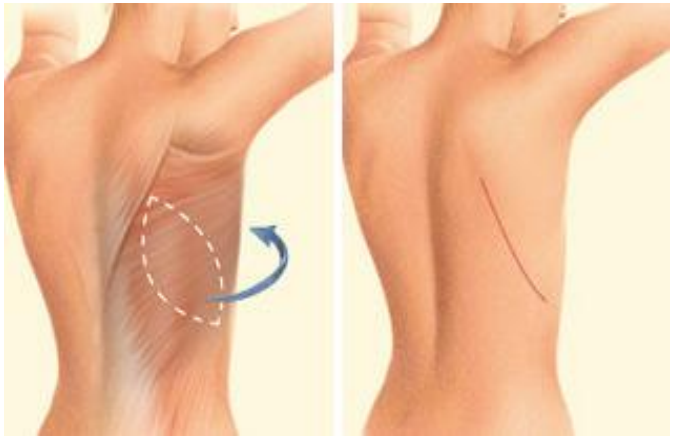


Figure 4 - The omentum flap on the thoracic wall.

Immediate Breast reconstruction

- Advantages
  - ↓ cost
  - Psychosocial benefits, body image, quality of life, Not given up hope
  - Normal breast landmarks preserved,technical ease → Improved cosmesis
- Disadvantages
  - Prolong operative time
  - Necrosis of mastectomy flaps
  - Higher complication rate
  - Large tumor size, direct skin involvement, ≥4 nodes + = Postop RT – adversely affect recon
- Relative contraindications
  - Advanced disease Stage 3, 4
  - Post op RT needed
  - Medical comorbidities eg. Active smoking, obesity, cardiopulmonary disease

CONTROVERSIAL for Advanced Disease

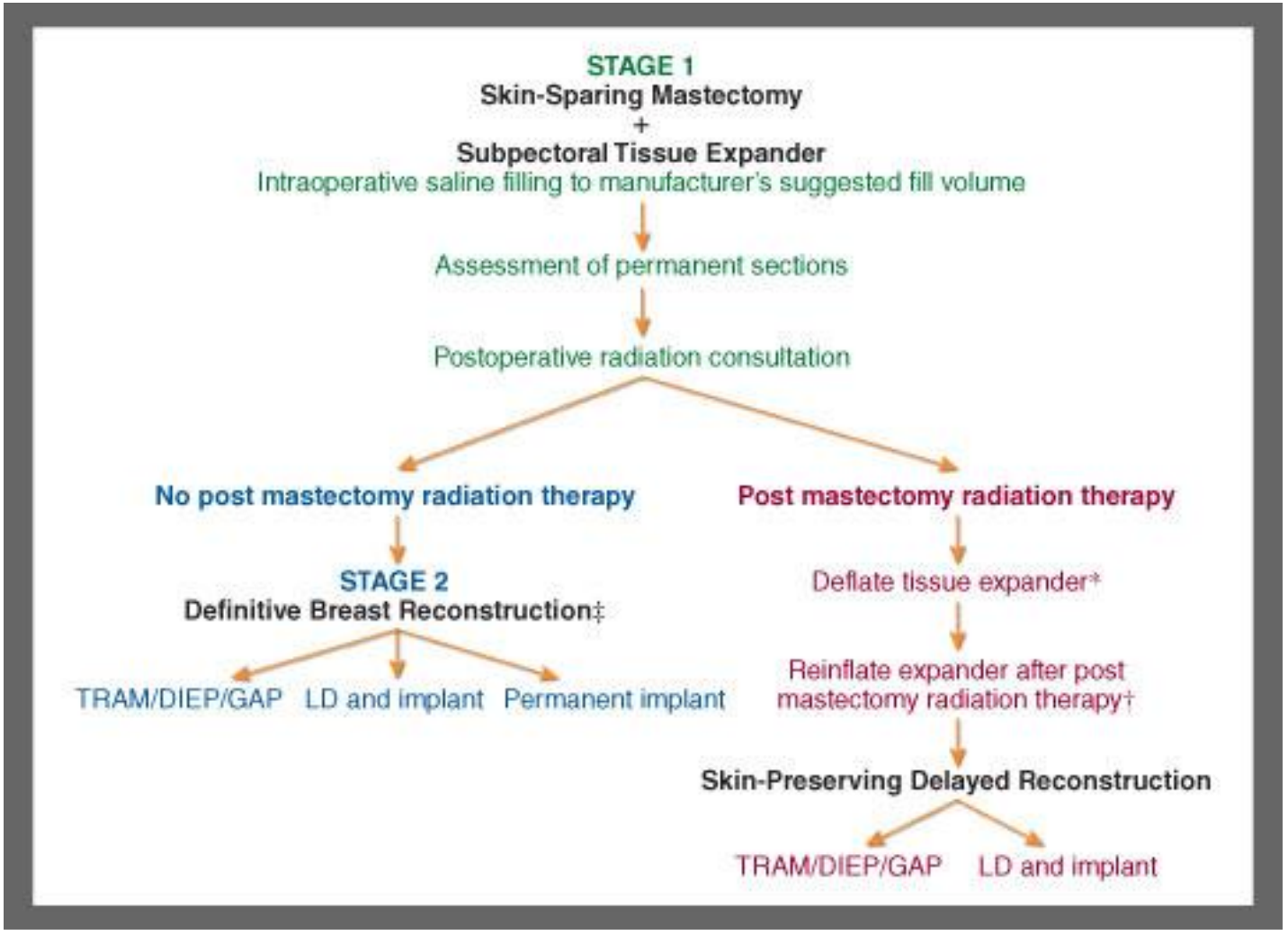
IBR for Advanced Breast Ca

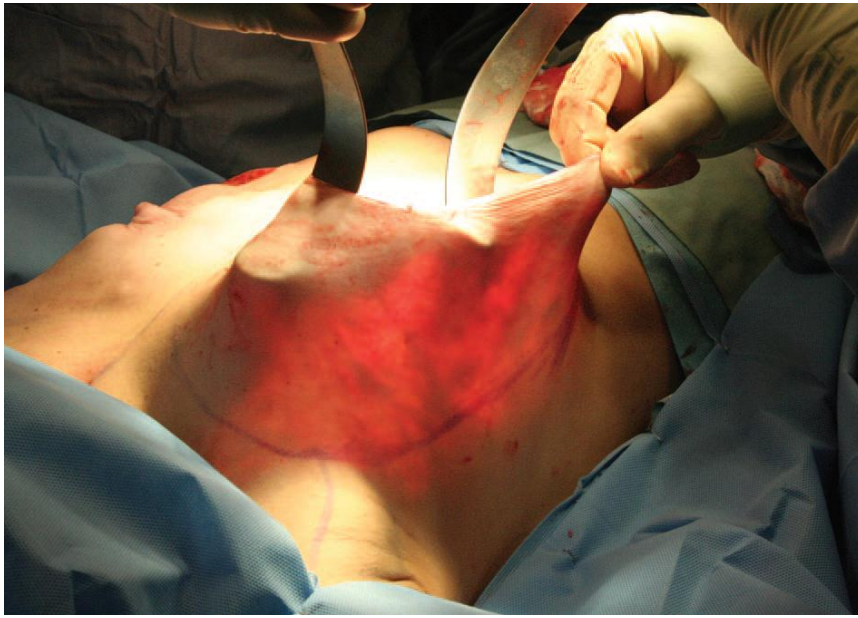
- Post op RT: Delayed reconstruction at our unit
- Dilemma: Need for RT only known after final pathology
- ?Delayed- immediate reconstruction
- IBR irrespective

Indications RT

- BCS
- Postmastectomy
  - T3-4 N0 M0
  - T1-2 N0 with pec fascia or muscle involvement, excision margins close or +
  - ≥ 4 nodes +
  - 1-3 nodes +: treat if score ≥ 3
    - ER - = 1
    - LV + = 1
    - Age ≤ 40 = 1
    - Nodes 1-3 = 1

Kronowitz et al



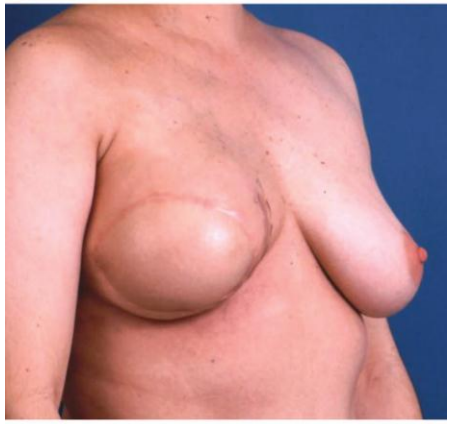


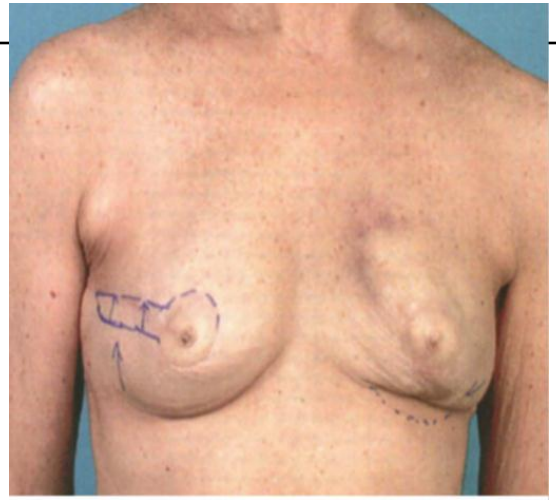
Mastectomy skin flap necrosis

- Wide skin excision → skin preserving mastectomy
  - ↑cosmesis
  - ↑risk compromised perfusion to skin
- Incidence: 1,5 – 15,8%
- Flap thickness
- Riskfactors:
  - ↑BMI
  - Tobacco 7.8% vs 1-2%
  - Prior breast RT
  - Pressure

- Evaluation:
  - Clinically: tissue quality, flap thickness, dermal edge bleeding
  - Fluorescein-dye
  - Indocyanine dye
  - Diffusion imaging spectroscopy/near-infrared spectroscopy
- ? Perfusion
  - Debride skin
  - Flap banking 100% survival Kovach et al

- Crisera et al. 170 Advanced breast Ca pts immediate free TRAM reconstruction
- Comparable complication rates to mastectomy alone.
- Delay to chemotherapy (4.7% pts) similar / less than mastectomy alone
- No delay in diagnosis of recurrence.
- Cosmetic outcome post RT: minimal distortion/ shrinkage.





- Godfrey et al. immediate autologous tissue reconstruction (21)
  - No major flap complications
  - No delay in adjuvant therapy
  - 3 recurrences
  - 5 pts metastatic disease
- Styblo et al. immediate TRAM recon (21)
  - No delay in adjuvant therapy
  - No increased risk of local recurrence

- Sultan et al.(22)TRAM
  - No flap loss
  - 14% Early perioperative morbidity
  - No delay in chemotherapy
  - 1 local recurence, 2 metastatic at 28 months
- Zimmerman et al. (21 pts) IBR free TRAM
  - Good cosmesis post RT 90% pts
  - 29% local / metastatic disease

- Newman et al. IBR for advanced Ca. Early complications comparable.
- 47% of implant recons required implant removal.
- IBR 35 d to chemo vs. 21 d mastectomy alone
- ? Oncologically insignificant similar rates of local or distant metastasis.

Table 3 Effect of immediate breast reconstruction on delay in commencement of chemotherapy and morbidity.

Study	Patient number IBR+CT	Patient number Mastectomy+CT	Reconstruction type	Time from surgery to CT Mean/median (days)	Chemotherapy delays	Morbidity during chemotherapy
Bailey et al.[47]	28	None	Tissue expanders or implant Expansion avoided during CT	NS	No delays	NS
Johnson et al.[4]	34	None	Silicon prosthesis	NS	No delays in initiation	NS
Hoffman et al.[48]	17	None	Implant or tissue expander Expansion avoided during nadir	42	1/17 (6%) delayed initiation 2/17 (12%) interruptions of 21 and 35 days	NS
Schusterman et al.[39]	28	None	TRAM	NS	7/28 (25%) delayed for wound complications	NS
Elliot et al.[49]	36	None	TRAM	NS	1/36 (3%) delayed initiation	NS
Furey et al.[50]	36	None	Tissue expander or silicon implant	36	No delay in initiation 2/36 (6%) required surgery during CT	10/36 (28%) wound complications
Yule et al.[38]	23	None	Tissue expander and subsequent implant Expansion avoided during CT	14–28	Month long delays in 2/23 patients	No increase in surgical complications in chemotherapy group
Yeh et al.[51]	15	None	TRAM, LD flap, implant or tissue expander	35	1/15 (7%) delayed	NS

Newman et al.[52]	50	72	TRAM, LD flap, implant Locally advanced cancers 25% preoperative chemotherapy	IBR/CT-35 Control-21	NS	No significant difference wound complications
Contant et al.[36]	27	None	Silicon prosthesis	NS	NS	One low grade infection
Caffo et al.[40]	52	63	Skin expander Expansion continued during chemotherapy	IBR/CT-44 Control-45	No delays	No significant difference in CT toxicity
Allweis et al.[41]	49	308	TRAM, LD flap, implant or LD and implant	IBR/CT-41 Control-53	No delay in initiation	NS
Taylor and Kumar[42]	44	49	TRAM, LD flap, implant	IBR/CT-38 Control-38	No delay in initiation Delays during chemotherapy comparable with controls	NS
Phipp et al.[53]	50	None	TRAM, LD flap, DIEP* tissue expander, implant	NS	9/50 (18%) delay in adjuvant chemotherapy or radiotherapy	NS
Aft et al.[43]	98	113	NS	IBR/CT-40.6	NS	NS

*Deep inferior epigastric perforator flap. CT=chemotherapy

Table 1 Local and distant recurrence after mastectomy and immediate breast reconstruction.

Study	Patient number	Follow-up Mean/median (months)	Local recurrence	Distant recurrence
Noone et al.[3]	185	26	10/185 (5%)	4/185 (2%)
Johnson et al.[4]	118	28	7/118 (6%)	11/118 (9%)
Kuske et al.[5]	66	48	5/66 (7%)	26/66 (39%)
Noone et al.[6]	306	77	16/306 (5%)	33/306 (11%)
Slavin et al.[7]	161	65	17/116 (15%)	NS (not specified)
Carlson et al.[8]*	187	37.5	9/187 (4.8%)	NS
Kroll et al.[9]*	104	67	7/104 (7%)	13/104 v
Sandelin et al.[10]	100	36	8/100 (8%)	9/100 (9%) died from disseminated disease
Petit et al.[11]	146	156	13/146 (9%)	22/146 (15%)
Hidalgo et al.[12]*	28	27	0/28	2/28 (7%)
Ringberg et al.[13]	79	43	4/79 (5%)	4/79 (5%)
Kroll et al.[14]*	154	72 or more	11/154 (7%)	16/154 (10%)
Toth et al.[15]*	50	57	0/50	5/50 (10%)
Rivadeneira et al.[16]	198	49	9/198 (5%)	NS
Vandeweyer et al.[17]	49	72	2/49 (4%)	7/49 (14%)
Foster et al.[18]	25	49.2	1/25 (4%)	4/25 (16%)
Medina-Franco et al.[19]*	173	73	7/173 (4%)	31/173 (18%)
Foster et al.[20]*	25	49.2	1/25 (4%)	4/25 (16%)
Brown et al.[21]*	151	48	3/151 (2%)	9/151 (6%)

*Majority of patients had skin-sparing mastectomy.

Reconstruction effect on RT

- Sloping contour – imprecise geometric match of medial and lateral irradiation fields
- Underdosing of chest wall , centrally under breast mound & internal mammary nodes
- Increased irradiation to normal tissues

RT effect on reconstruction

- Implants
  - ↑ capsular contractures
  - Spear et al 47,5% irradiated breasts with saline implants needed conversion to flap reconstruction
- Autologous reconstruction
  - Early complications not significantly more likely
  - ↑ late complications in immediate recon (fat necrosis, volume loss, flap contracture)
- Delayed recon post RT
  - Autogenous tissue preferred

Table 4 Radiotherapy immediately after mastectomy and IBR with implant or expander.

Study	Patient number	Follow-up Mean/median (months)	Cosmesis) (% good/ excellent	Capsular contraction (%)
Chu et al.[56]	5	30	3/5 (60%)	2/5 (40%)
Von Smitten and Sundell[57]	15	30	1/15 (7%)	NS
Rosato and dowden[58]	15	34	NS	11/15 (73%)
Evans et al.[59]	9	38	NS	3/9 (33%)
Ramon et al.[60]	11	34	Radiotherapy associated with lower surgeon cosmesis score	6/11 (55%) Baker III or IV
Spear and Majidian[61]	18	19	NS	4/18 (2.2%)
Victor et al.[62]	13	32	7/13 (54%)	4/13 (31%)
Ringberg et al.[13]	9	43	NS	6/9 (67%)
Contant et al.[36]	13	30	NS	5/13 (38%)
Spear and Onyevu[63]	24	28	Mean cosmesis score 2.99 Scale 1–4	13/40 (33%)*
Krueger et al.[64]	9	31	50% patient satisfaction*	5/19 (26%)*
Tallet et al.[65]	47	25	54%*	8/47 (17%)

*Result combined with patients receiving preoperative radiotherapy.

Table 7 Autologous tissue reconstruction after previous chest wall irradiation.

Study	Patient number	Reconstruction type	Follow-up Mean/median (months)	Cosmesis (% good/excellent)	Flap tissue loss/necrosis (%)
Hartrampf and Bennett[74]	52	TRAM	Approx 36	NS	6/52 (12%) flap tissue loss
Salmon et al.[75]	40	Lat dorsi	NS	NS	2/40 (5%) minor skin necrosis
Jacobsen et al.[76]	47	TRAM (18% also had implant)	29	NS	4/47 (8%) fat necrosis 3/47 (6%) flap tissue loss
Kroll et al.[77]	82	Lat dorsi or TRAM	24	64(%)	28/82 (34%) flap tissue loss
Kroll et al.[78]	65	TRAM	NS	Mean cosmesis score 2.70 Scale 1–4	NS
Williams et al.[79]	108	TRAM	28	NS	19/108 (17.6%) fat necrosis 3/108 (2.8%) full thickness skin loss
Tran et al.[34]	70	TRAM	60	NS	5/70 (7%) partial flap loss 6/70 (9%) fat necrosis

Table 6 Effect of implant insertion as a component of breast reconstruction in previously irradiated tissue.

Study	Patient number	Reconstruction type	Follow-up Mean/median (months)	Cosmesis (% good excellent)	Capsular contraction (%)
Dickson and Sharpe[71]	10	implant	NS	NS	3/10 (33%)
Olenius and Jurell[72]	11	implant	32	5/11 (45%) acceptable cosmesis	NS
Evans et al.[59]	7	implant	42	NS	11/30 (37%)
	19	implant+lat dorsi			
	4	implant+TRAM			
Kraemer et al.[73]	35	implant	46	11/35 (31%)	15/35 (43%)
Contant et al.[36]	15	implant	30	NS	9/15 (60%)
Spear and Onyewu[63]	16	implant	28	Mean cosmesis score 2.9 (Scale 1–4)	13/40 (33%)*
Krueger et al.[64]	10	implant	31	50% patient satisfaction*	5/19 (26%)*

*Result includes patients having radiotherapy post-reconstruction.

Conclusion

- Conflicting reports on oncological safety and good cosmetic outcome for immediate breast reconstruction
- Timing of surgery
- Known post-op RT – Delay reconstruction
- Patient selection
  - Non smokers
  - N BMI

Thank you

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Tamoxifen

- Estrogen agonist-antagonist
- In molar excess it acts like a competitive antagonist of estrogen activity in the breast but not in other estrogen- sensitive tissues, hence the side-effects.
  - Hot flushes
  - ↑ Endometrial Ca
  - Tromboembolism

Implant –based techniques

- Indications
  - Skin envelope adequate
  - Smaller, minimally ptotic breasts
  - Contralateral breast surgery planned for symmetry
  - Distant donor site/ surgical risk unacceptable
- Contraindications
  - Planned postop RT
  - Implant unacceptable
  - Large ptotic breast to match (relative)
  - Unstable circulation in skin envelope (relative)
  - Current smoker (relative)

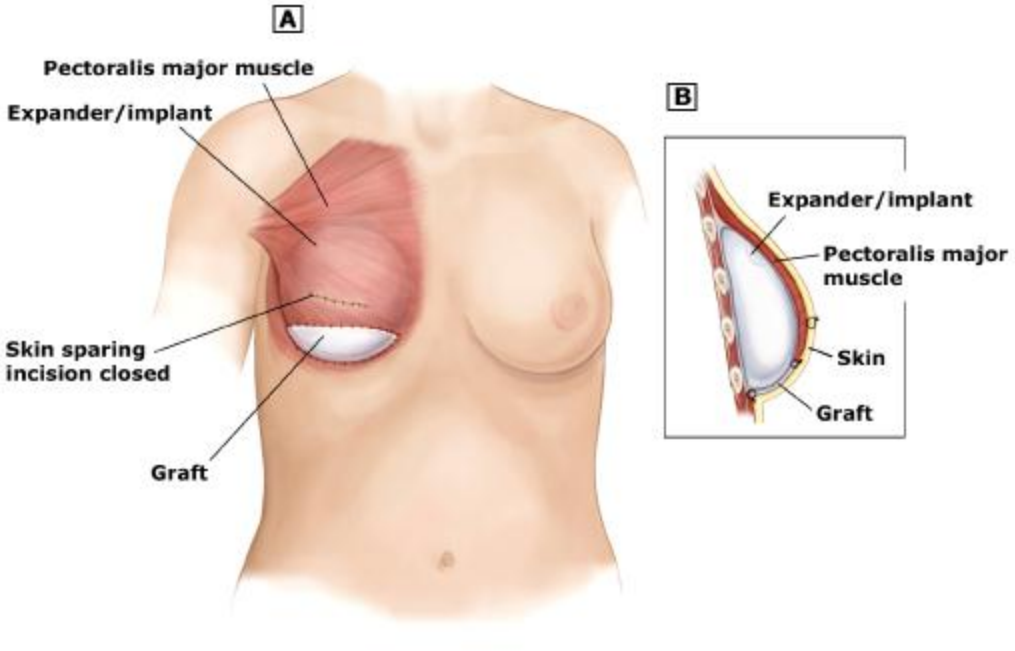
Implant –based techniques

- Advantages
  - Surgical simplicity
  - Cosmeticically similar adjajent tissue cover implant
  - No donor site morbidity
  - ↓ operative time
  - Rapid postop recovery (7-10 d)
- Disadvantages
  - Frequent clinic visits
  - 2nd Surgery
  - Better cosmesis and pt satisfaction with autogenous techniques
- Complications
  - Infection
  - Capsular contracture
  - Deflation

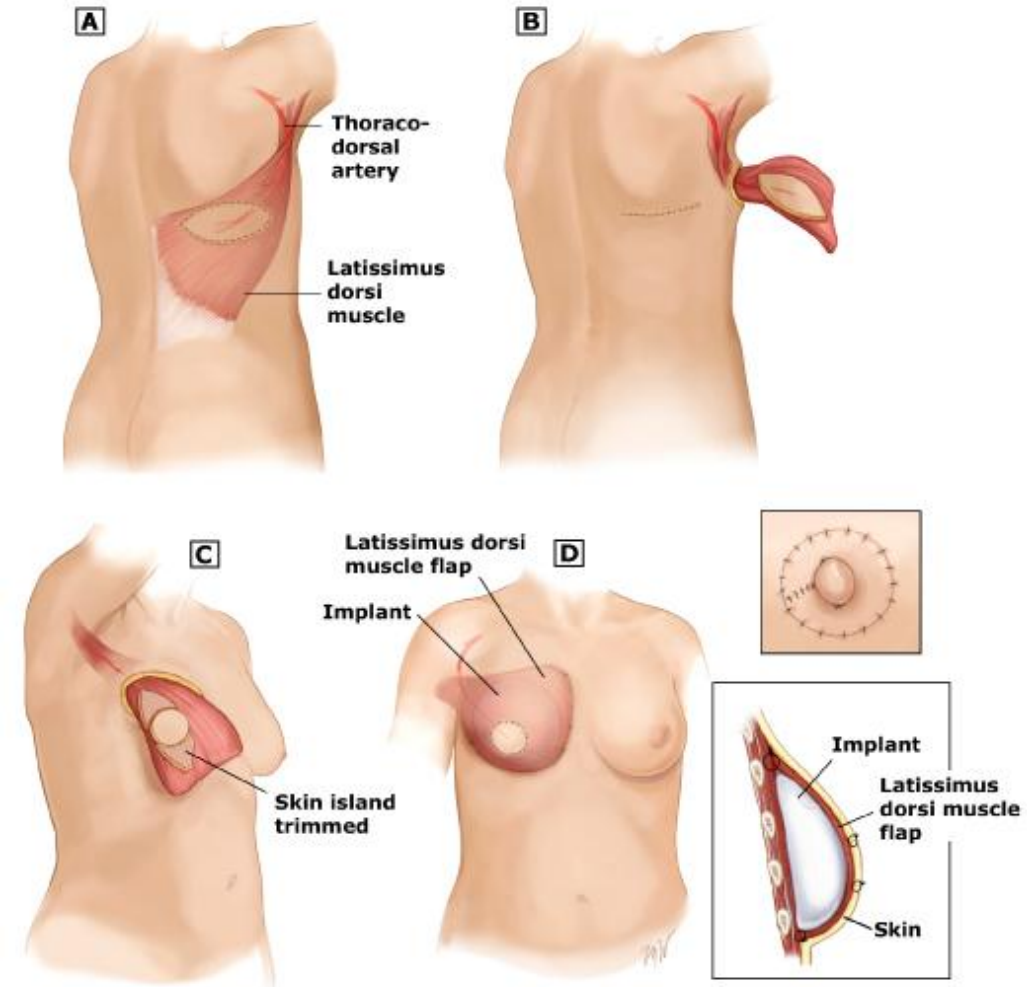
Mastectomy flap necrosis

- Hultman et al. Factors associated with flap complications
- ↑BMI
- Previous breast/ mediastinal irradiation
- DM
- Need for reoperation
- Not significant

Implant Breast Reconstruction



Latissimus dorsi flap reconstruction



Latissimus dorsi musculocutaneous flap

- Indications
  - Inadequate skin envelope, other flaps unavailable
  - Skin-sparing mastectomy: Skin island for NAC, or muscle coverage
  - Autogenous recon: other donor sites unavailable
  - Recon of quadrantectomy segmental defect fro BCS
  - Recon of Poland syndrome with breast agenesis

Latissimus dorsi musculocutaneous flap

- Contraindications
  - Prior lateral thoracotomy, lats divided
  - Prior division thoracodorsal a, vv (relative if branches via serratus ant muscle to lats intact)
  - Planned RT post recon (relative)
  - Prior RT to ipsilateral post sup trunk (relative)
  - Competitive athlete using lats (relative)
  - Current smoker (relative)

Latissimus dorsi musculocutaneous flap

- Advantages
  - Reliable, suitable to marginal candidates for more complicated flap techniques
- Disadvantages
  - Donor site scarring
  - Implant and/or expander needed
- Complications
  - Seroma donor site
  - Hematoma
  - Infection
  - Fat necrosis
  - Partial or total flap loss (Low)

TNM Classification

- T
  - Tis Carcinoma in situ
  - T1 ≤ 2cm
  - T2 > 2 cm ≤ 5cm
  - T3 > 5 cm
  - T4 any size extension to chest wall (T4a), or skin (T4b), or both (T4c). Inflammatory carcinoma (T4d)
- N
  - N0 No regional nodes
  - N1 1-3 axillary nodes + and/or int. mammary + by biopsy
  - N2 4-9 axillary nodes + or int. mammary clinically +
  - N3 ≥ 10 axillary nodes + or axillary and int. mammary metastasis
- M
  - M0 no distant metastasis
  - M1 distant metastasis

St Gallen

- Low risk
  - N- and all of:
    - pT ≤ 2cm
    - Grade 1
    - Absence extensive peritumoral vascular invasion
    - ER and/ or PgR +
    - Her2/ Neu gene –
    - Age≥ 35 yrs
- Intermediate risk
  - Node – and at least one of:
    - pT > 2cm
    - Grade 2-3
    - Presence extensive peritumoral vascular invasion
    - ER and PgR –
    - Her2/ neu +
    - Age < 35 yrs
  - Node + (1-3) and
    - ER/ PgR + and
    - Her2/neu -
- High risk
  - Node + (1-3) and
    - ER and PgR -
    - HER2/neu +
  - Node + (4 or more)

Table 2 Breast cancer detection after previous augmentation.

Study	Patient number	Standard mammogram	Compression/ displacement	Number with abnormal mammogram	Number with abnormal radiology (including ultrasound)	Node positive at presentation (%)	Mean tumour size (cms)
Leibman and Kruse[26]	11	9/11	2/11	9/11 (82%)	10/11 (91%)	4/11 (36%)	NS
Silverstein et al. [29]	42	35/42	7/42	27/42 (64%)	NS	19/38 (50%)	2.3
Carlson et al.[30]	35	31/35	0/35	17/31 (55%)	19/31 (61%)	16/35 (46%)	NS
Clarke et al.[31]	33	29/33		19/29 (66%)	23/33 (70%)	6/31 (19%)	1.5
Cahan et al.[28]	22	NS	NS	NS 4/23 detected by mammogram alone	NS	7/22 (32%)	1.2

Table 5 Effect of radiotherapy following conservative surgery for carcinoma in previously augmented breast.

Study	Patient number	Follow-up Mean/median (months)	Cosmesis (% good/excellent)	Capsular contracture (%)
Ryu et al.[66]	3	30	1/3 (33%)	1/3 (33%)
Chu et al.[56]	7	44	6/7 (86%)	NS
Guenther et al.[67]	20	46	17/20 (85%)	NS
Handel et al.[68]	26	36	NS	17/26 (65%)
Mark et al.[69]	21	22	9/21 (43%)	12/21(57%)
Victor et al.[62]	9	32	8/8 (100%)	0/8
Karanas et al.[70]	19	38	18/19 (95%) "not poor"	3/19 (16%)

Table 8 Chest wall irradiation following autologous tissue breast reconstruction.

Study	Patient number	Follow-up Mean/median (months)	Reconstruction type	Cosmesis (% good/excellent)	Flap complications (%)
Williams et al.[80]	19	53.2	TRAM	NS	3/19 (15.8%) fat necrosis 6/19 (31.6%) fibrosis
Zimmerman et al.[81]	21	19	TRAM	18/20 (90%)	0/21 flap complications
Tran et al.[82]	41	36	TRAM	7/41 (17%) good symmetry	10/41 (24%) flap contracture 14/41 (34%) fat necrosis
Rogers and Allen[83]	30	19.9	Deep inferior epigastric perforator flap	Assessed in 10 patients 7/10—worse cosmesis after radiotherapy	5/30 (17%) flap contracture 7/30 (23%) fat necrosis