

Mandibular Reconstruction



Dr Anthony J Kane MBBS FRACS
Plastic and Reconstructive Surgery Unit
Princess Alexandra Hospital

Disclaimer

- The copy in this file is protected by the copyright of the author or authors. Consent was provided for the express purpose of educating attendees of the 2012 Registrar's Conference in Brisbane.
- You **MAY NOT** copy or distribute the contents or images in any form.
- You **MAY PRINT** the document for your own personal use as an educational resource.

History



- Earliest report with autogenous bone is Bardenheuer in 1892. Forehead flap with bone
- Sykoff first bone graft in 1900
- WW1 Lindemann and Klapp independently concluded that iliac crest was preferred site.
- By the end of ww2 iliac crest was standard with success of 90.7%

History



- Around the same time Mowlem developed technique with cancellous bone chips. ?Benefited for increased cellularity and healing
- Manchester published a seminal article with the use of sculpted iliac crest.
- Use initially of non vascularised bone grafts for malignant cases
- In the 70's reports with plate reconstructions and other alloplasts
- vascularised bone transfers in 1979 Taylor

Aetiology



- tumour benign or malignant
- Trauma
- congenital
- Infection/ Osteoradionecrosis

The obvious difference is that malignancy cases usually involve postop radiotherapy. Vascularised bone then is undoubtedly the gold standard and is for all reconstructions except in the very small defect.

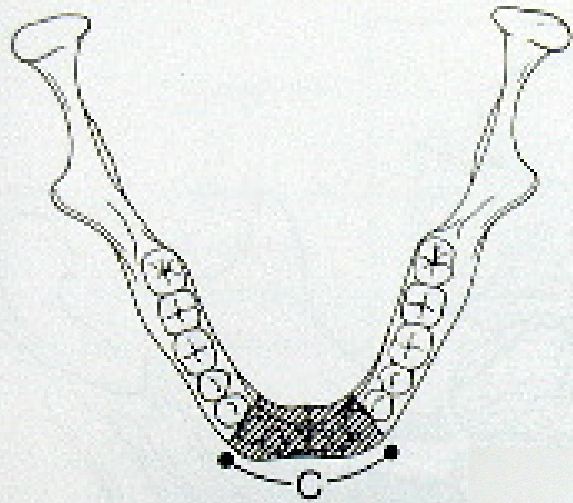
Goals of reconstruction

- Allow oral continence and adequate airway
- Reconstitute bony arch and allow primary bone healing
- Maintain occlusion and adequate oral opening
- Provide mobility of the tongue and provide oral lining
- Possibility of dental rehabilitation
- Cosmesis

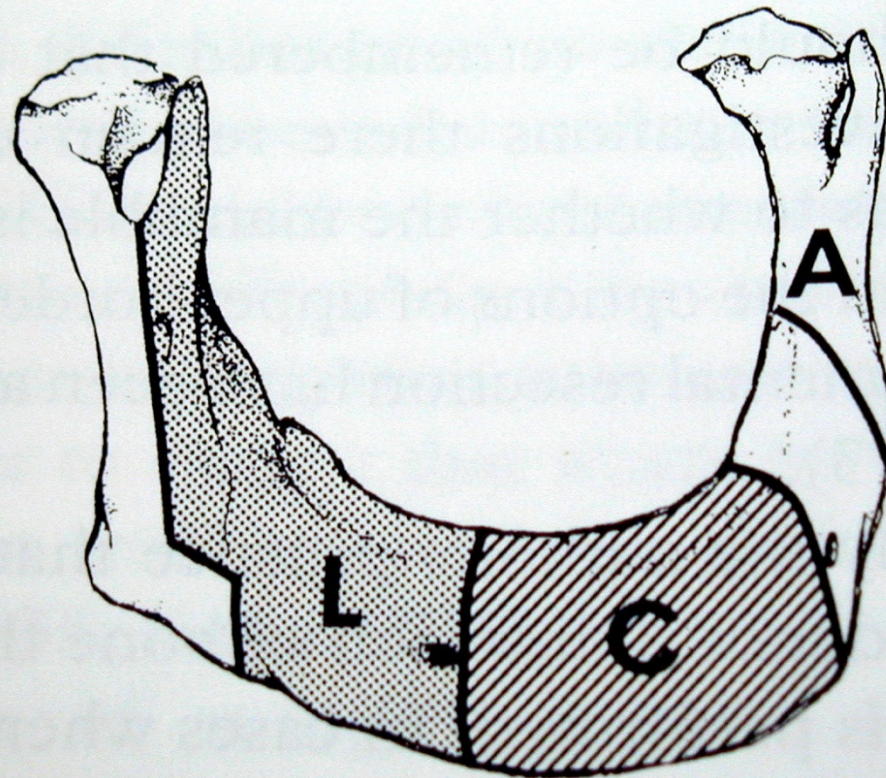
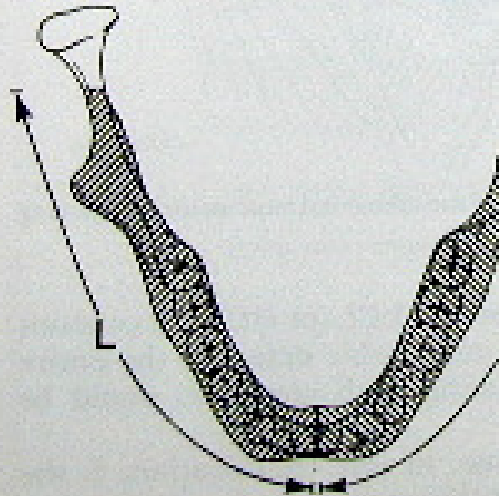
Classification of Defects



- Boyd's classification using the HCL classification (Jewer originally)
- useful but very difficult to work out
- adds OSM to classification for skin or mucosal defect
- Soutar's modification



Reconstruction Class	Bony Deficit			
H				
L				
C				



Reconstruction Plates

- Had
- com
- high
- extr
- Plac
- reco
- measure to hold segments before definitive
- recon



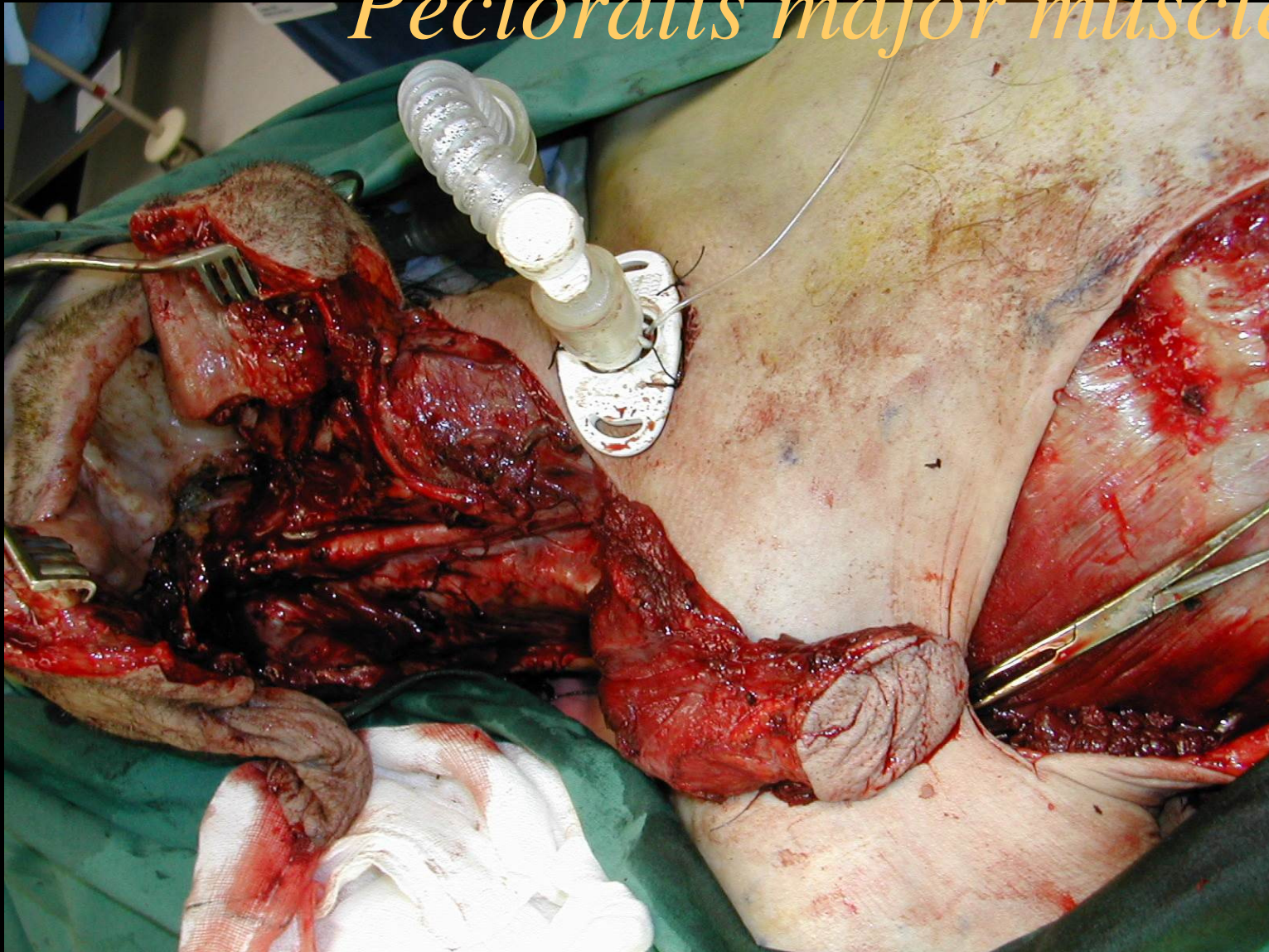
apy

re

Bone grafting Non vascularized

- Used in the post war period with some success for post traumatic bone loss
- Very rare for plastic surgeons to see a case that requires this
- Iliac crest sculpted in to shape or bone chips in a tray
- Most reasonable size defects better with vascularised bone to allow primary healing

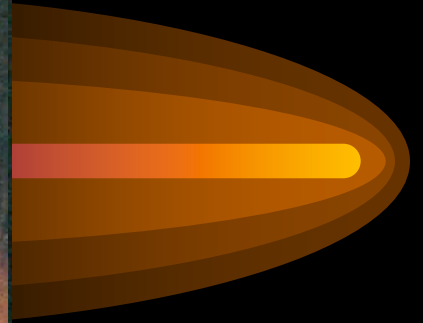
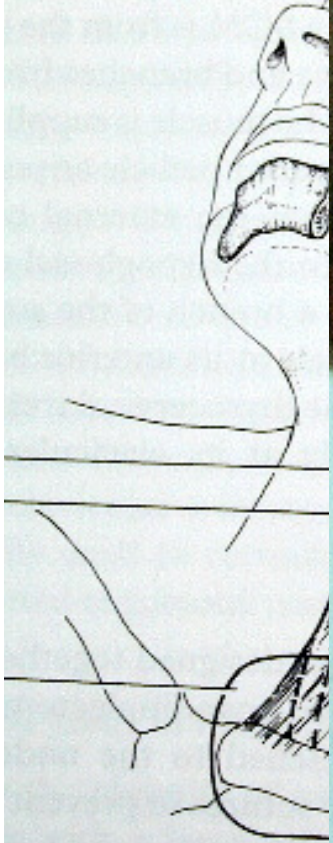
Pectoralis major muscle

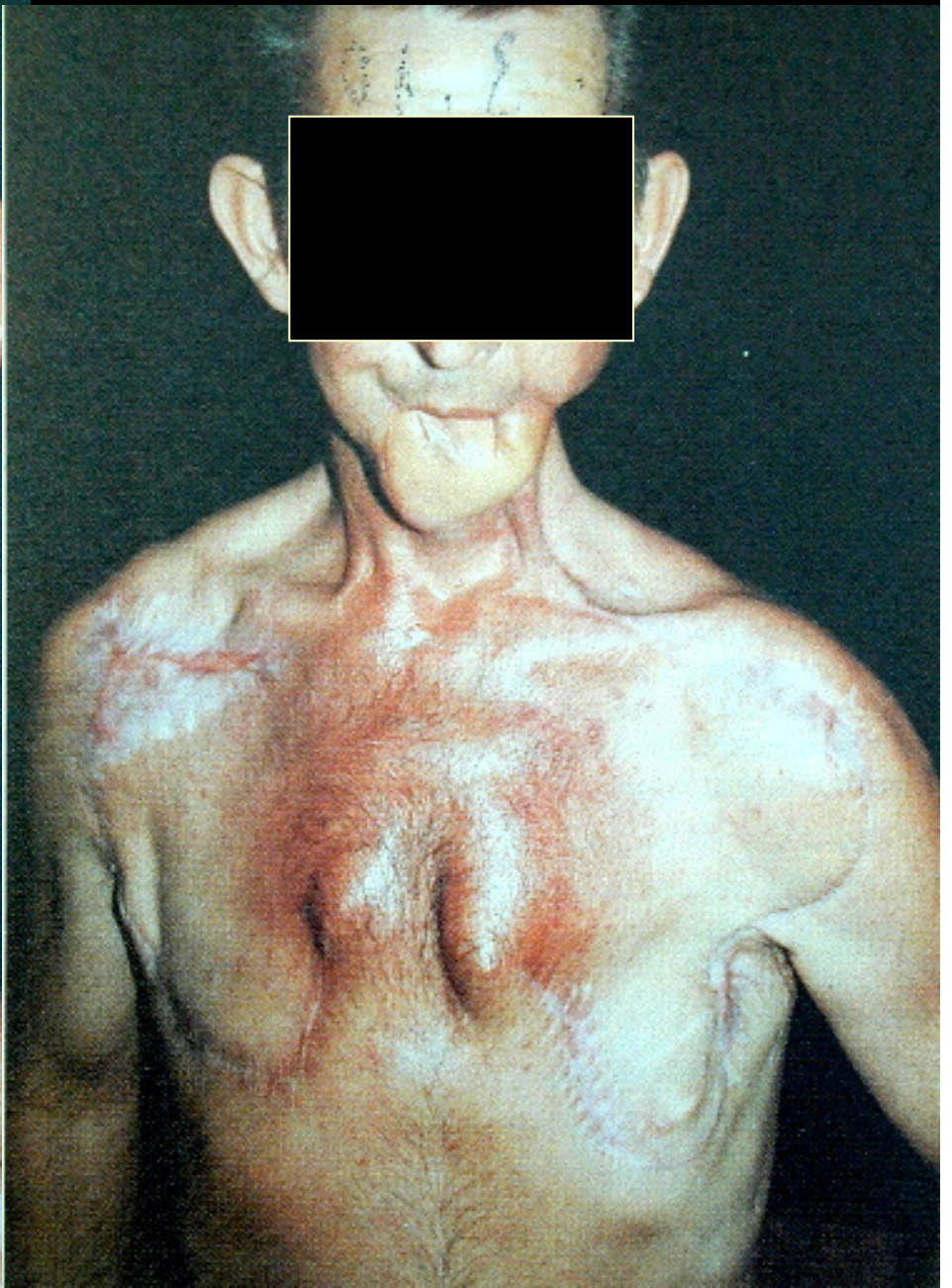
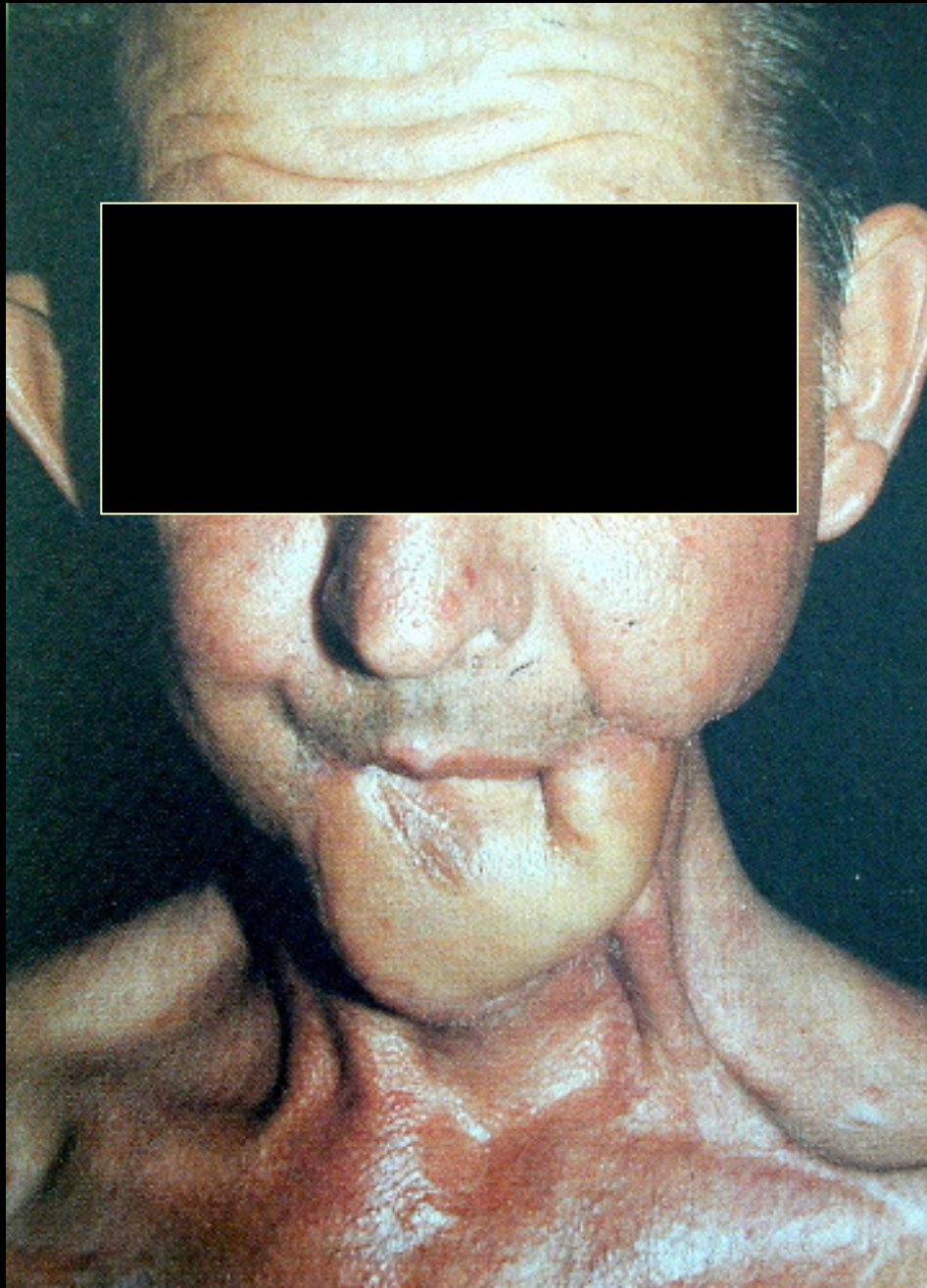


Regional Flaps with Bone

- Pectoralis major with rib or sternum
 - sternocleidomastoid with clavicle
 - forehead flaps or temporalis with calvarium
 - trapezius flap with spine of scapula
-
- Blood supply to the bone is tenuous. The skin and muscle is very bulky. Results are variable and the reach of flaps is limited

EXCISION AND RECON





Free Flaps with Bone

- Blood supply is more robust and usually endosteal and often segmental
- large composites of tissue can be transferred
- multiple osteotomies permissible
- large amounts of bone available
- osseointegration possible

Free Flaps with Bone

- Fibular flap on peroneal vessels
- Iliac crest on Deep Circumflex Iliac vessels
- Radial artery flap with radius
- Scapula flap on Circumflex scapula vessels
- Lateral arm flap with humerus on radial collateral vessels
- Vascularised rib on intercostal vessels or internal mammary vessels
- Second toe and metatarsal on dorsalis pedis
- Ulnar forearm flap

Options for the segments

- Ramus(H): nil, fibula radial forearm flap
- Hemimandible(H): DCIA, fibula
- Lateral segment(L): fibula or DCIA
- Anterior segment(C): fibula or forearm

Algorithm

Algorithm for Mandible Reconstruction with Osseous Free Flap

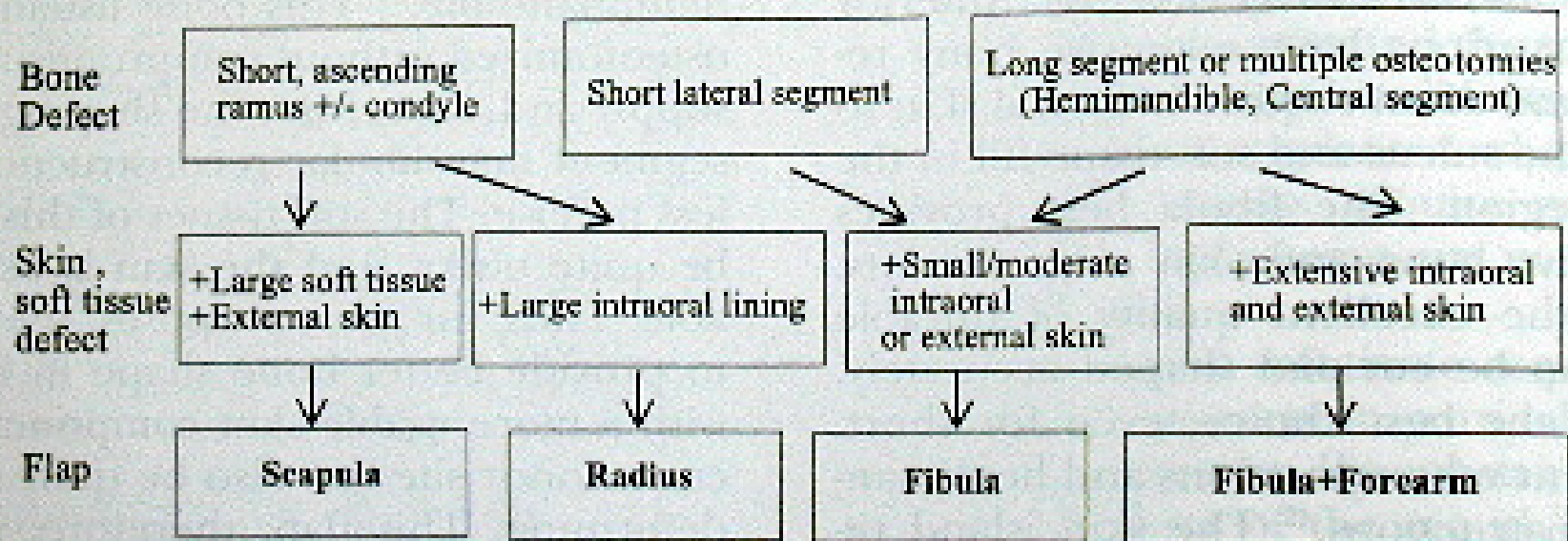


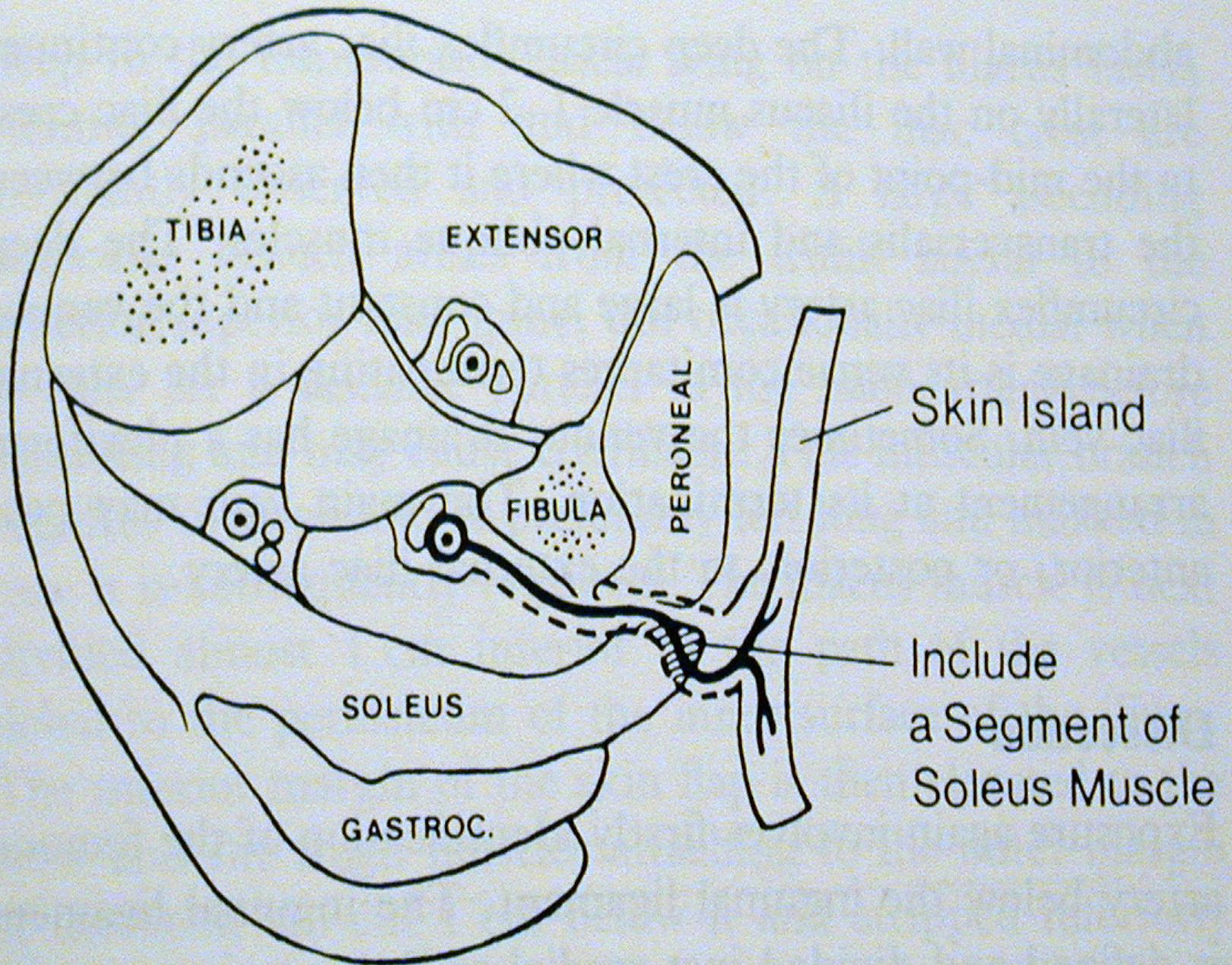
FIG. 4. Algorithm for mandible reconstruction with osseous free flaps. Donor-site selection is based primarily on the location and extent of the bony defect and the associated soft-tissue requirements.

Fibula Flaps

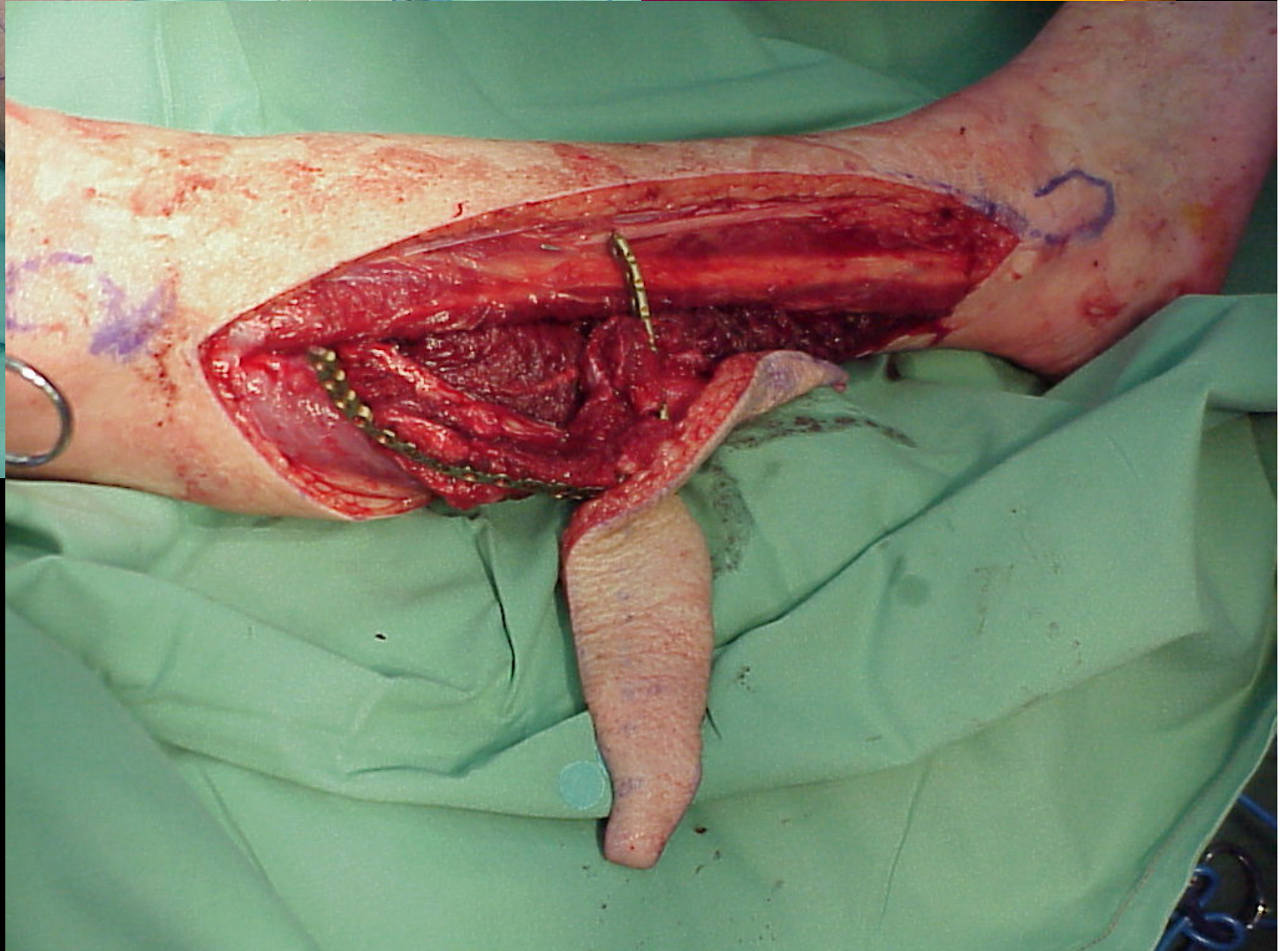
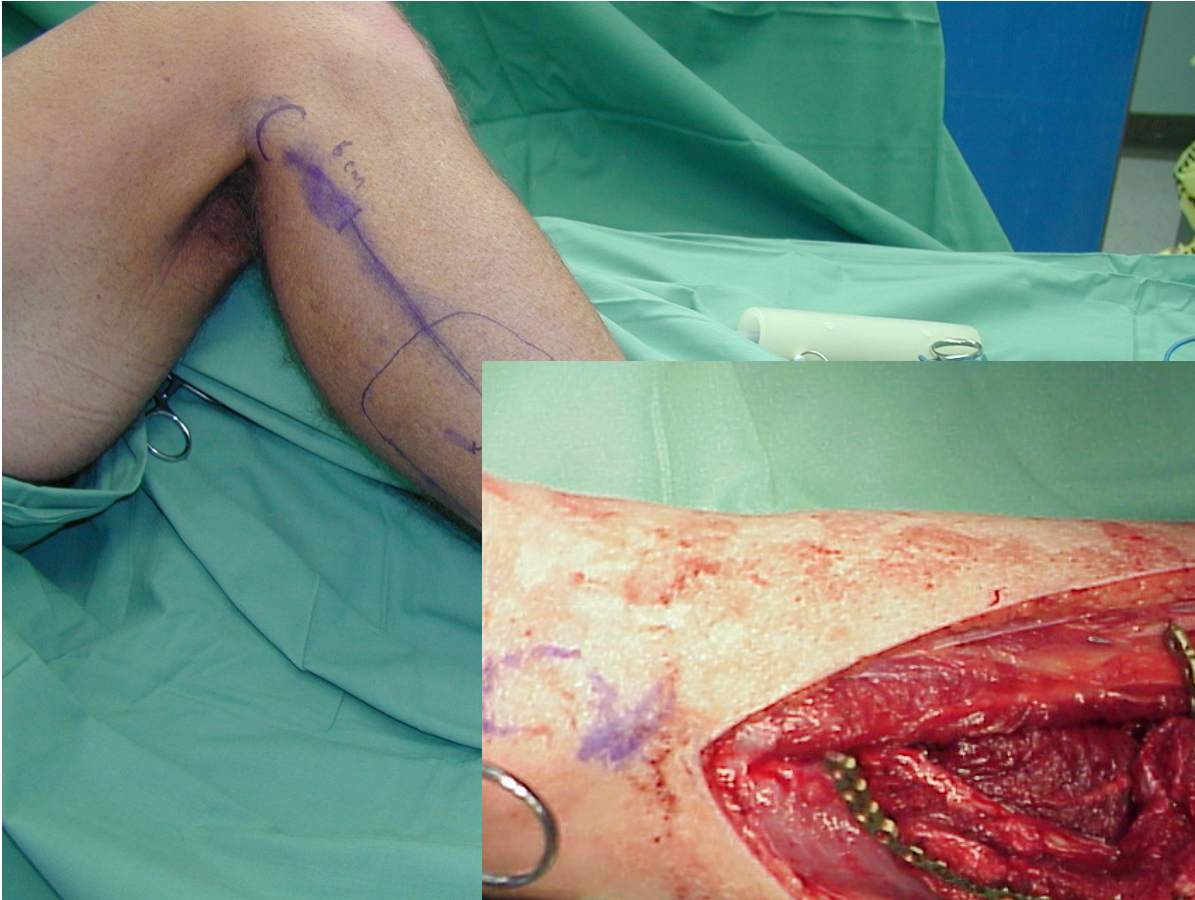
- Described by Ueba 1973, Taylor 1975
- very versatile for mandible reconstruction
- large composites of tissue available for transfer if you wish- muscle and skin
- Pedicle short but can be lengthened with dissection off the bone
- good endosteal supply around the midshaft but also good periosteal supply so osteotomies are safe . Therefore ideal for the c segment.

Fibula Flaps

- Downsides are the thickness of the bone not as good as iliac crest but still adequate for implantation
- Occasional donor site anatomical problems
- Problems with skin paddle viability and thickness in women
- Very bulky mucosal reconstruction in anterior floor of mouth – I usually excise it



Planning

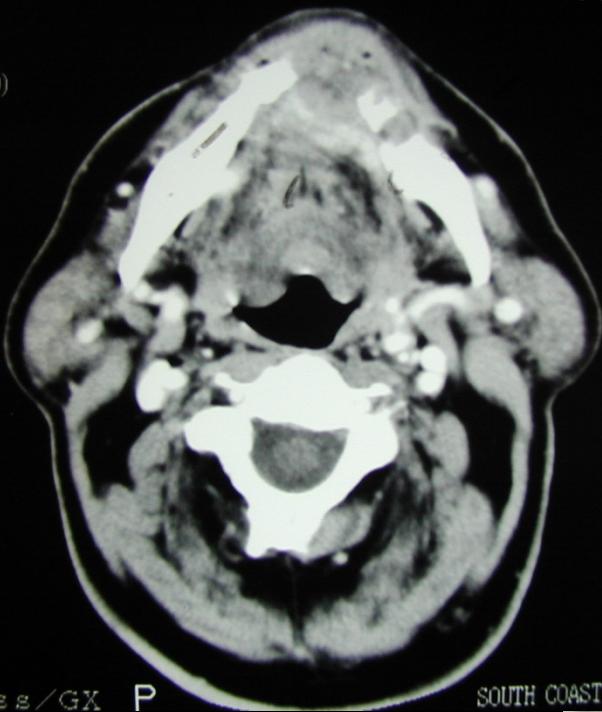


Fibular Flap

2/CE
+120.5mm
+0.0D
200.00mm
(250, 209)

07.08.00 11:52:04.3
120kV/300mA
68V/M
HCT
-7.0mm/r
INTERP-2

R

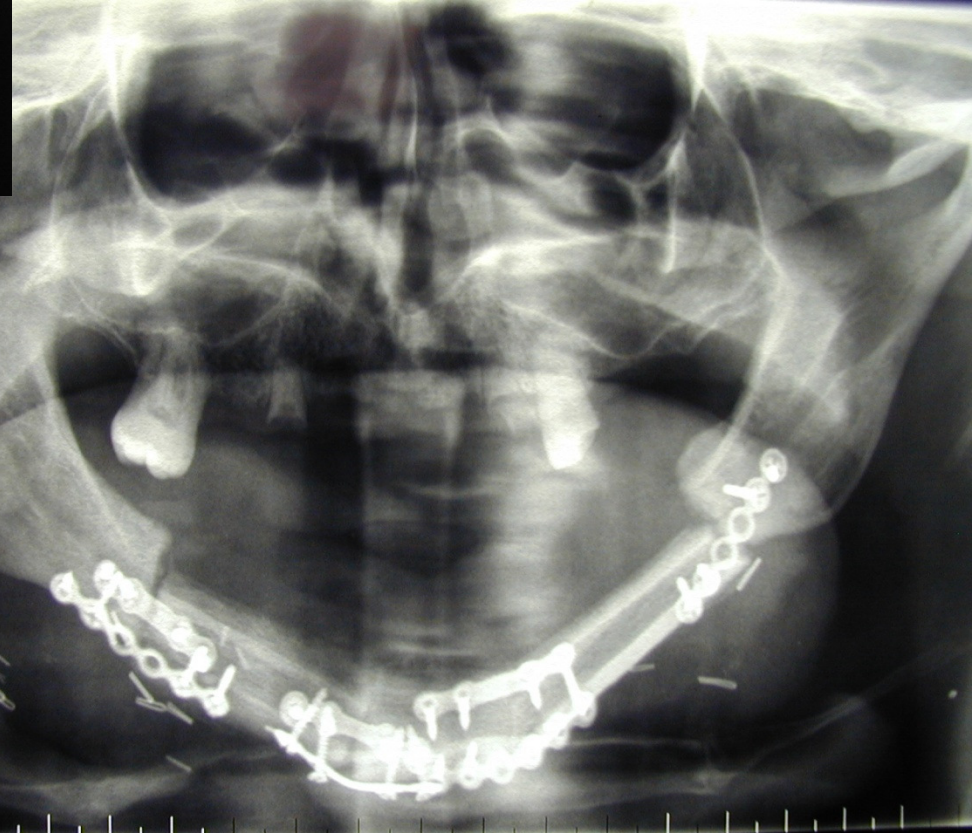


WL = 35
WW = 250

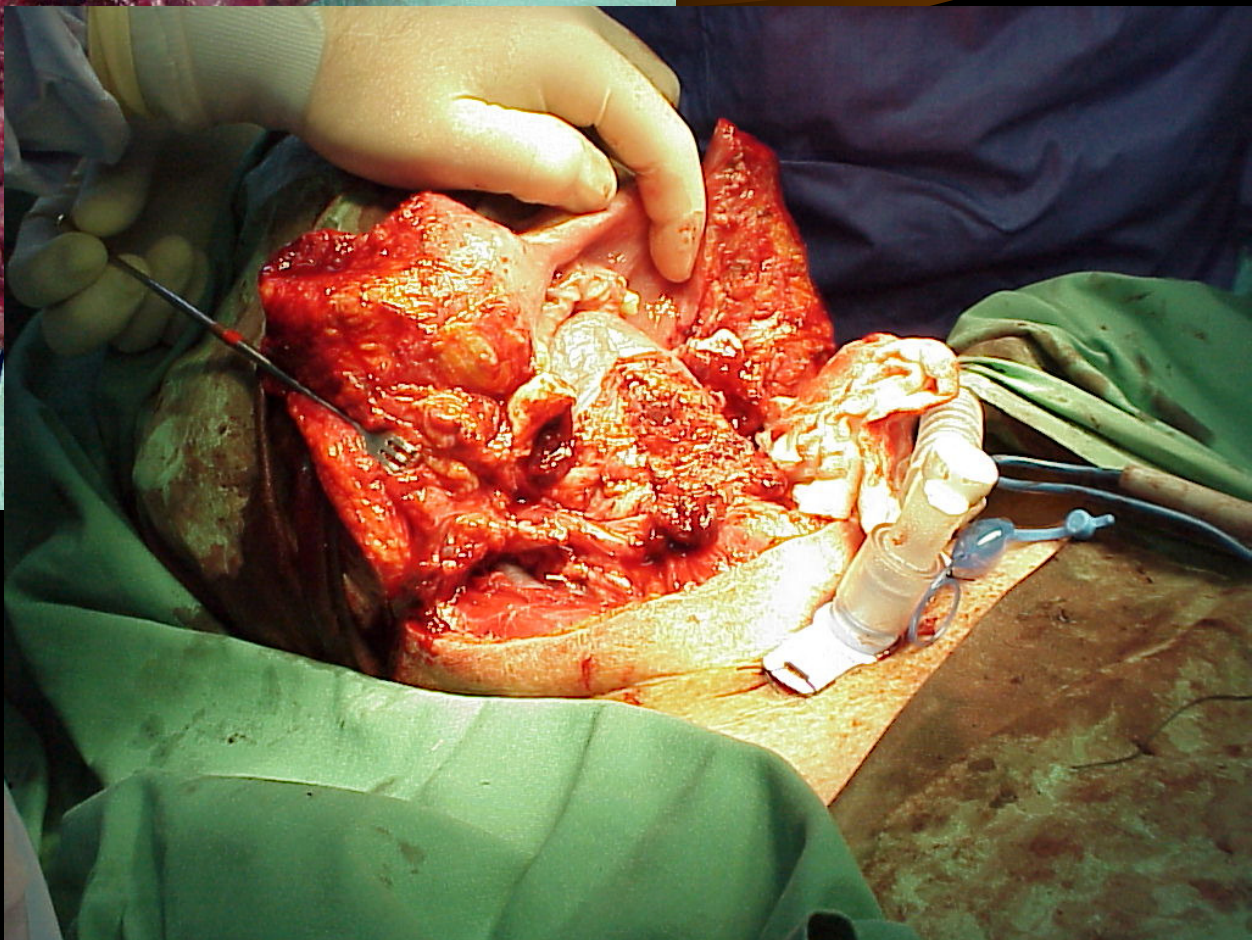
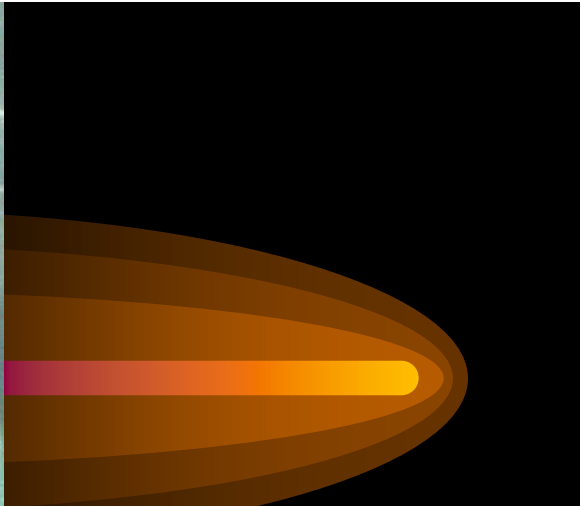
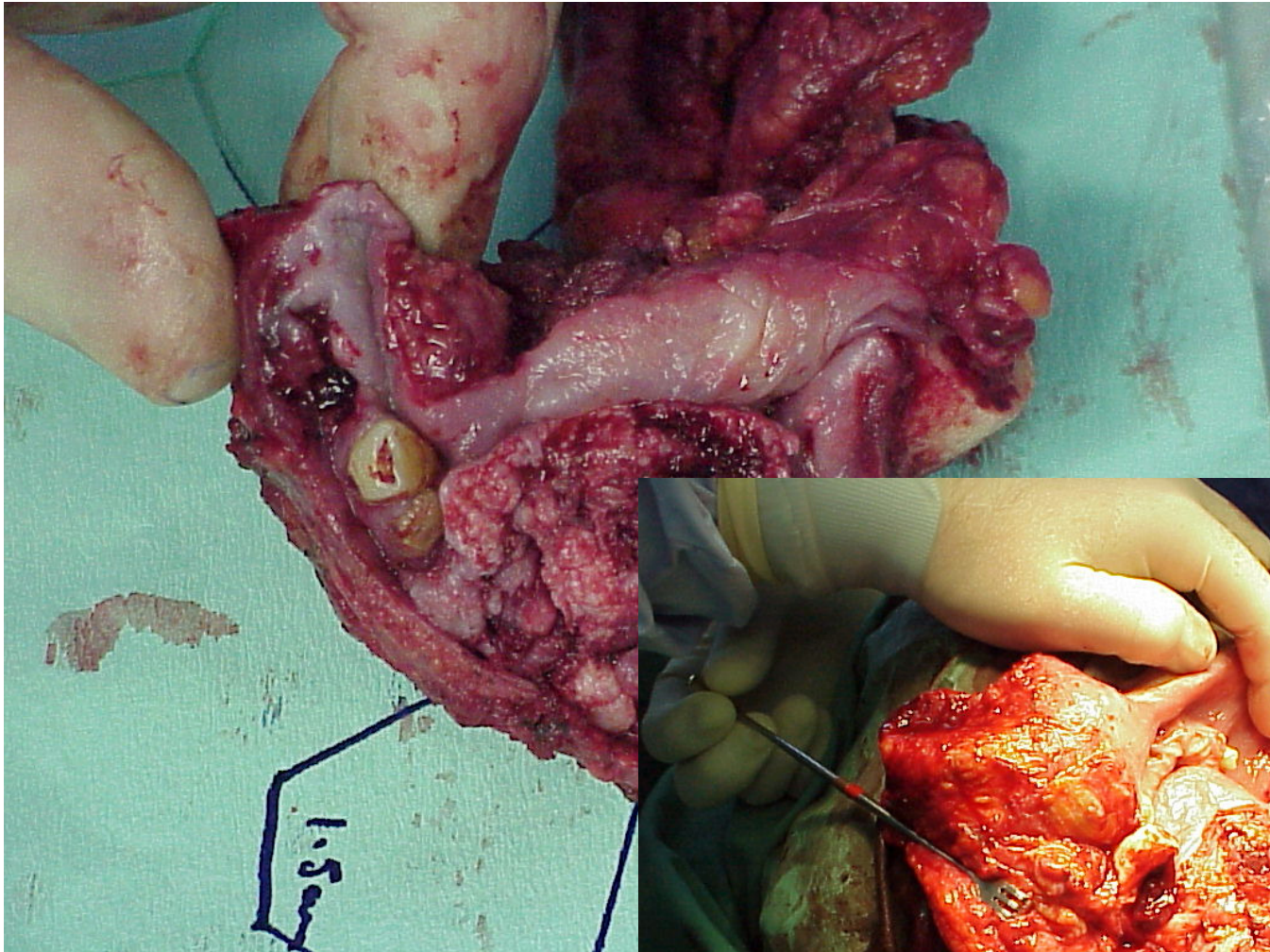
864:17
ULTRAVIST

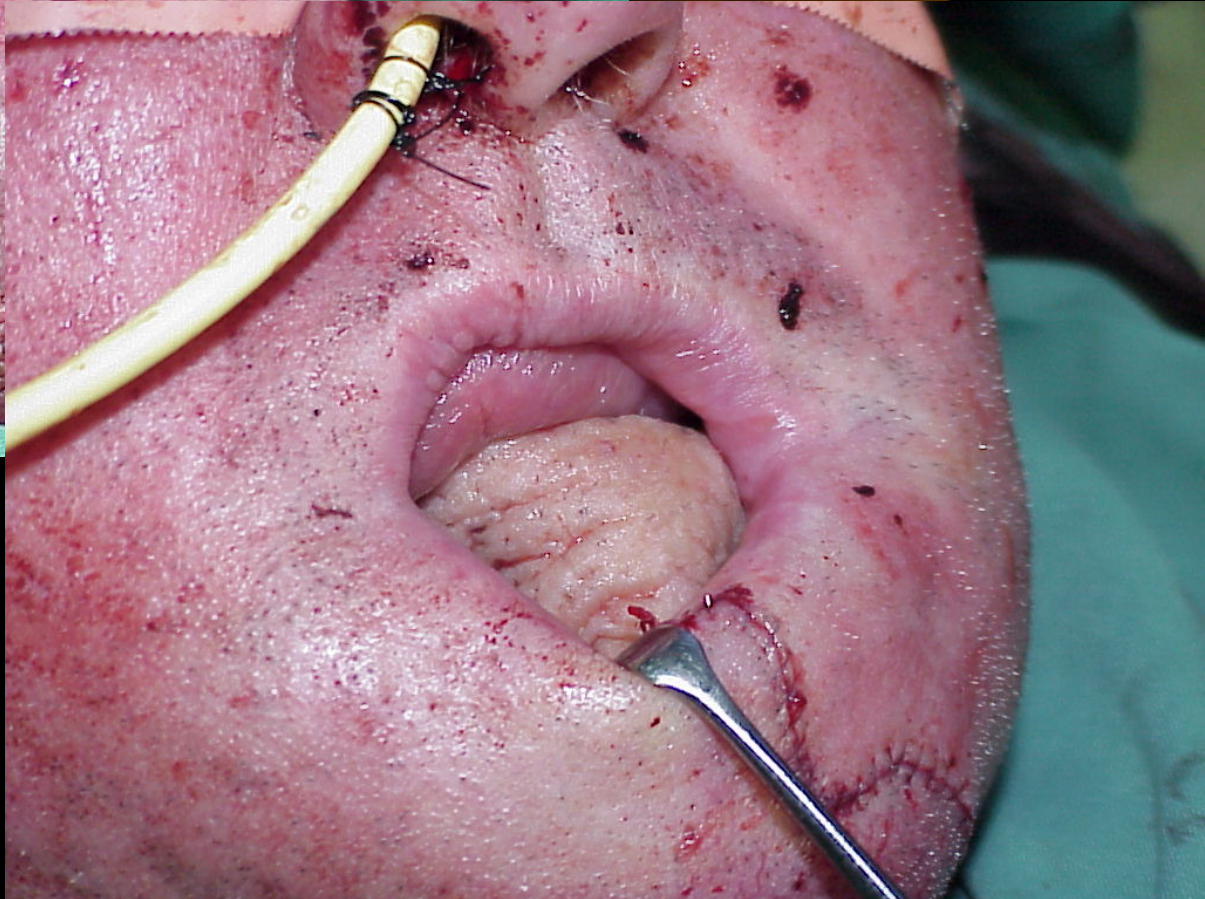
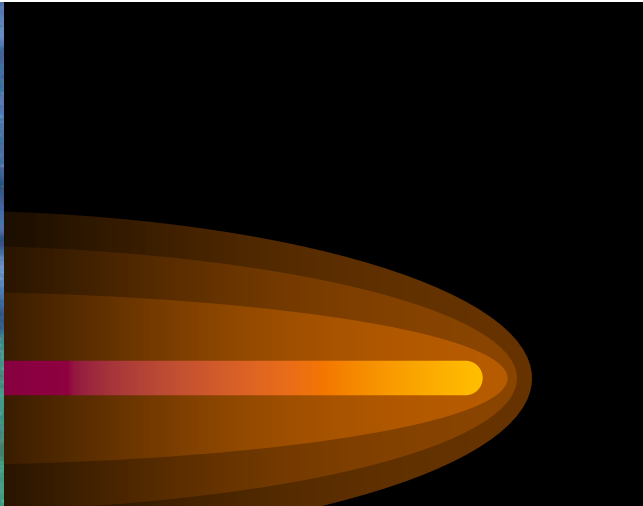
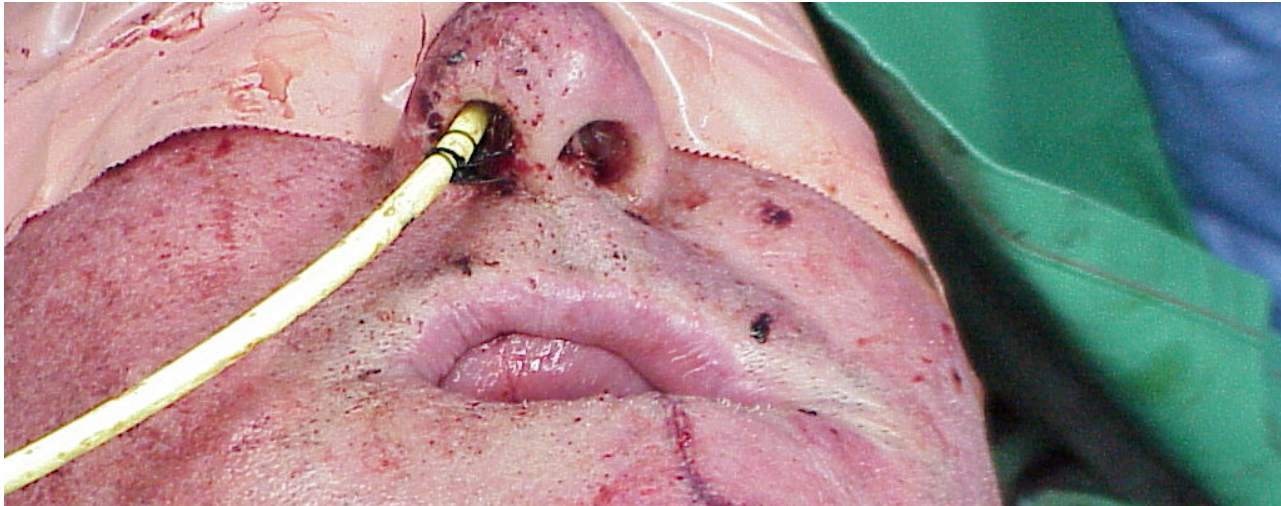
Xpress/GX P

SOUTH COAST RAD. - MUR'BAH



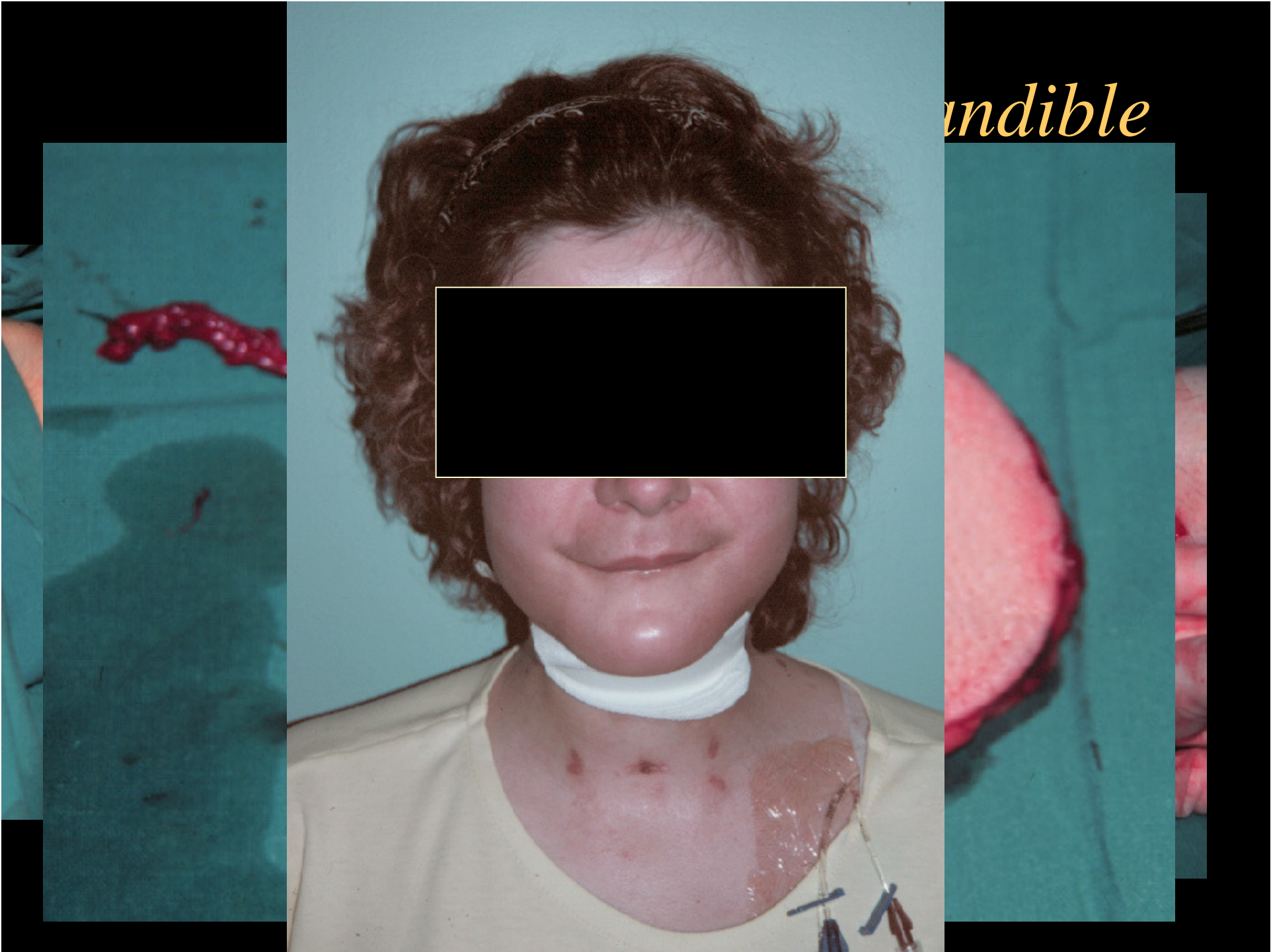
1.0s
M/5
SU/HE/OFF
FCO1/ORG/







mandible



Iliac Crest (DCIA)

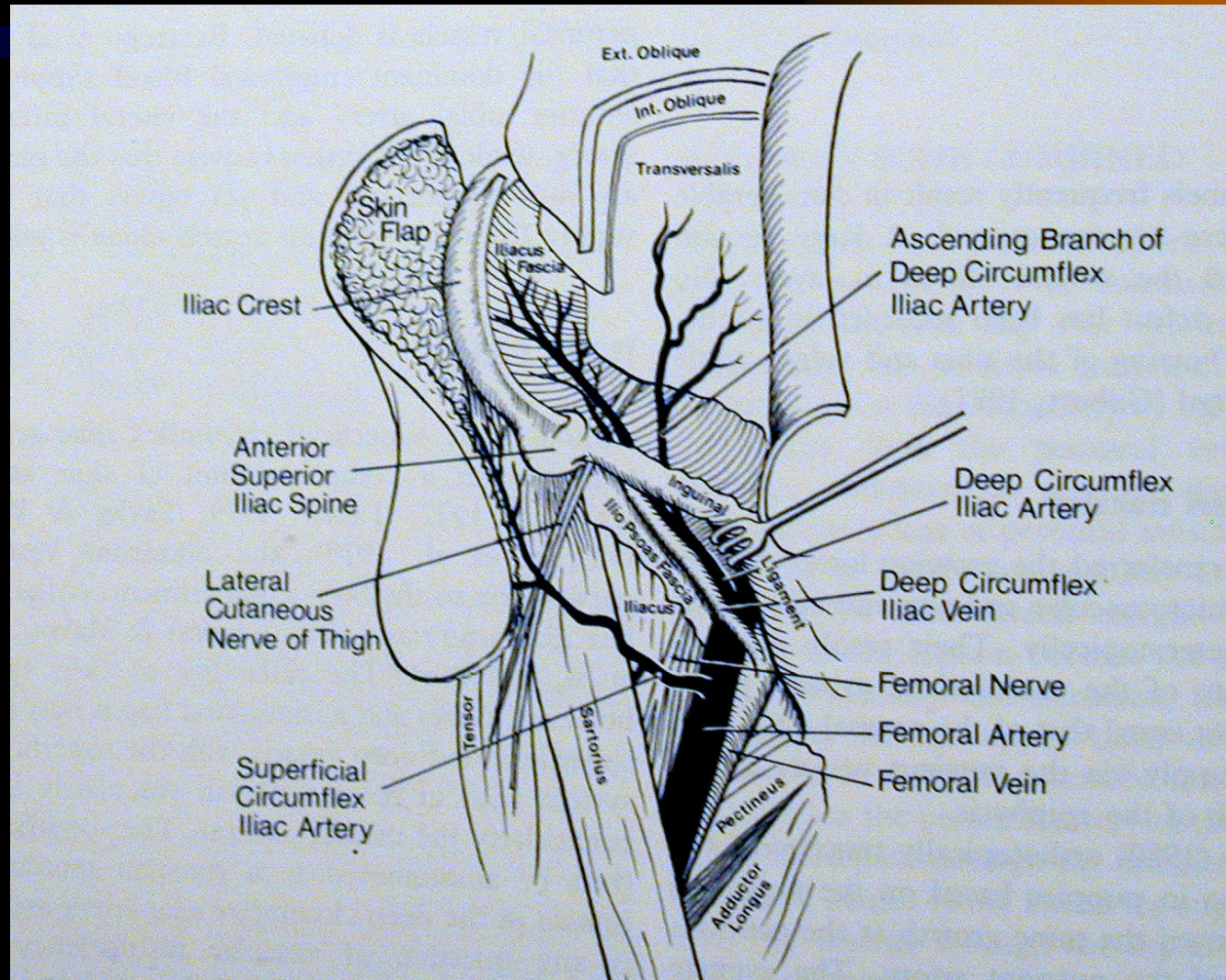


- Taylor in 1979
- Supply via the Deep Circumflex Iliac Vessels
- good long vascular pedicle although dissection can be difficult
- Large composite of tissue with external skin and internal oblique available
- very good bone stock
- segmental nutrient arteries allows multiple osteotomies

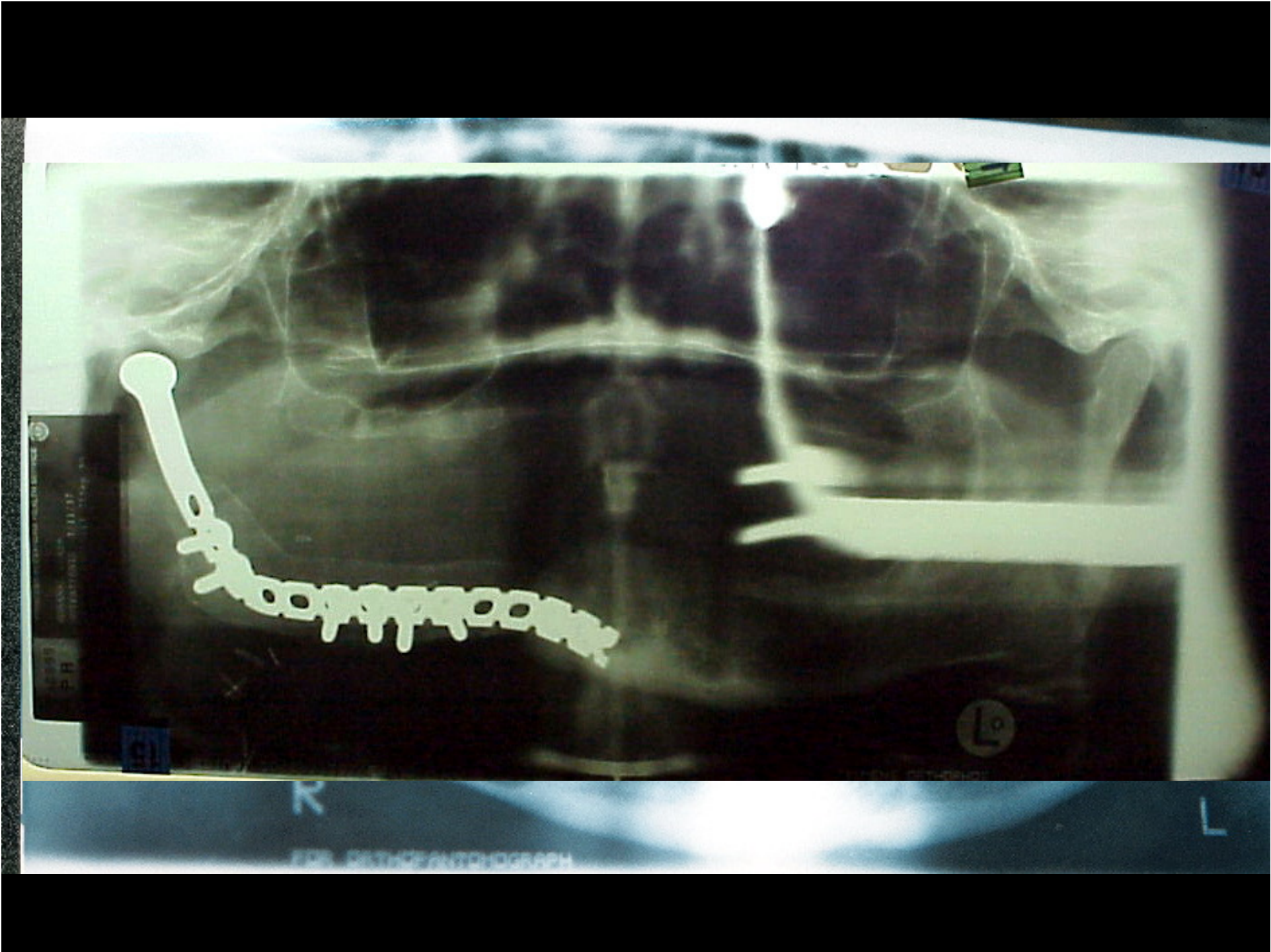
Iliac Crest (DCIA)

- Disadvantages : Bulky skin often - not very suitable for lining and especially not if implants envisaged.
- Donor site morbidity with hernias, bulges, pain or parasthesia. Some of this overcome with only using the inner table only for the transfer

DCIA Anatomy



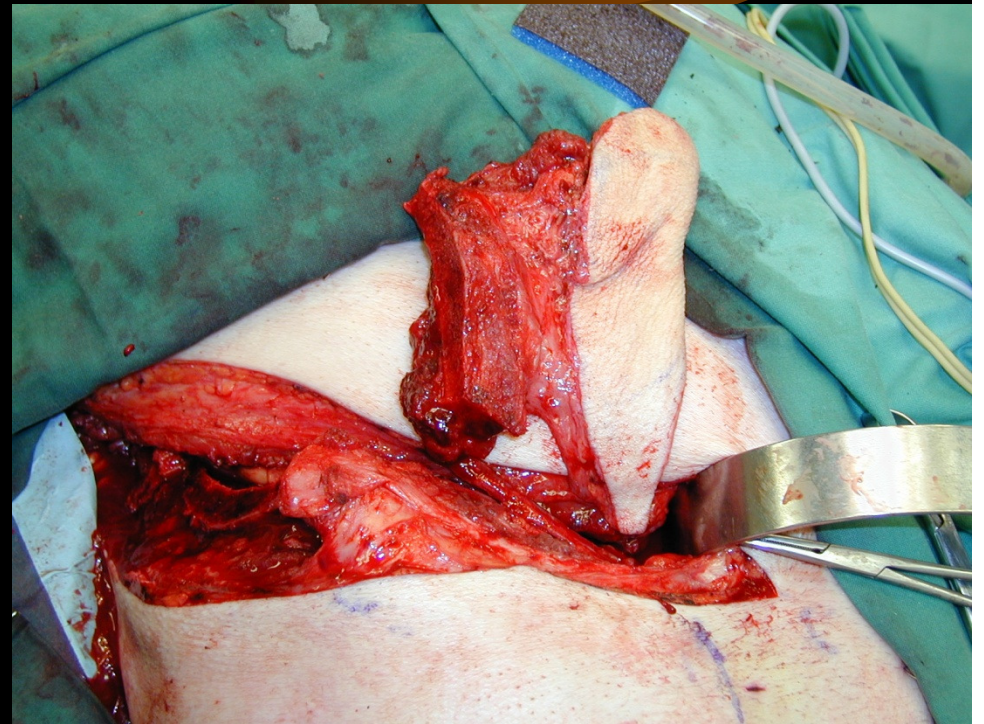
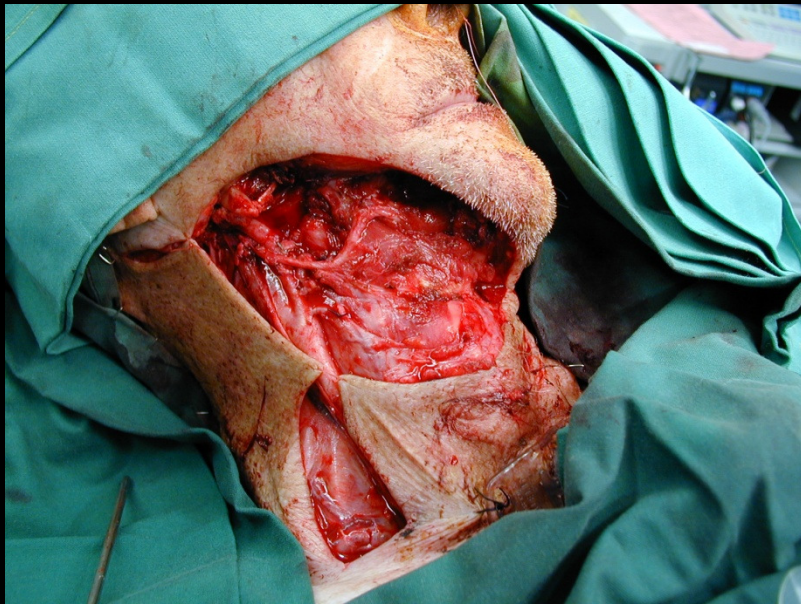




Hemimandible



Dcia



Dcia



Radial forearm flap with bone

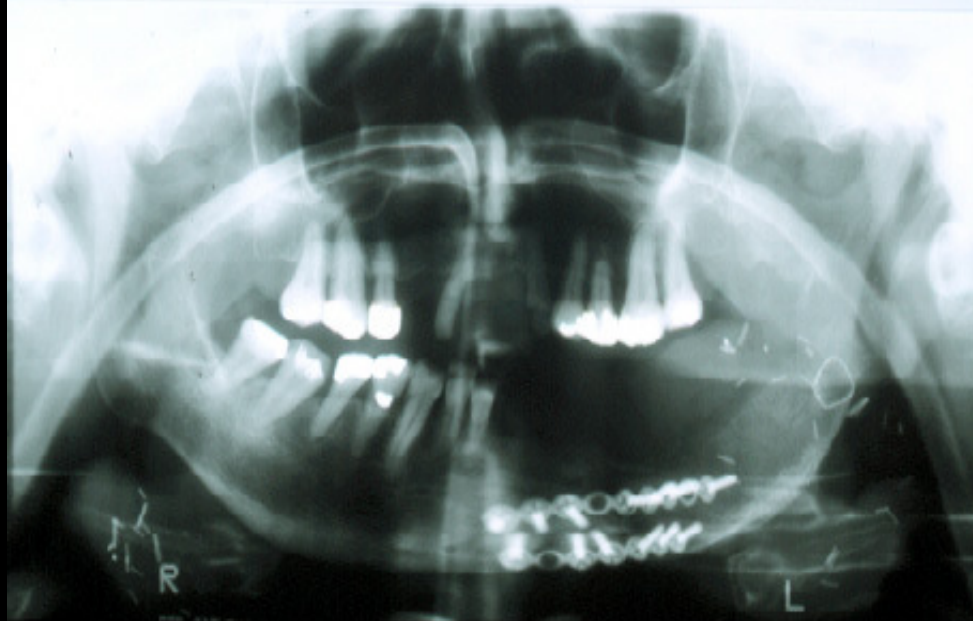
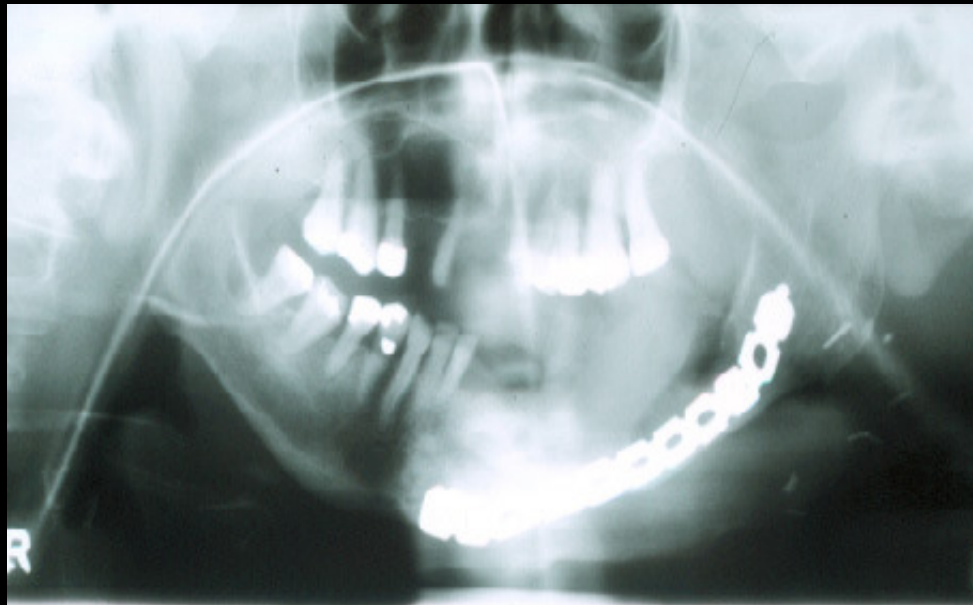
- Described by Soutar et al
- good reliable flap with long pedicle
- thin skin for lining
- Problems with implants
- Donor site morbidity
- Bone length limited

- Probably best used for small defects ie segmental in edentulous

Radial forearm flap with bone



TT . 1:1 1







summary

- Challenging reconstructive area therefore need *careful planning* re pedicles, osteotomies skin paddle placement
- Most of your patients will be receiving radiation post op so *vascularized transfer* key
- Consider the trilaminar nature of the recon
- There is a place for no bony recon in lateral segments with good function