

# IN SITU TISSUE ENGINEERING WITH INTEGRA

## BENEFITS OF A DERMAL REGENERATION TEMPLATE IN COMPLEX TRAUMA

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INGENIERÍA DE TEJIDOS IN SITU CON INTEGRA • Beneficios de una Plantilla de Regeneración Dérmica en Trauma Complejo



*The perils of trauma.*    —♦♦—    **Fight With the Redskins, 1889**    —♦♦—    *Los peligros de traumatismo.*

# INTEGRA COLLAGEN-GAG MATIX

## BENEFITS FOR TRAUMA

Acute care of the patient.

Acute preservation and closure of the wound.

Acute preemptive reconstruction.

Late reconstruction.



# PARADIGMS OF CONVENTIONAL WOUND CLOSURE & RECONSTRUCTION

All depend on normal post-inflammatory wound healing.



**0 -  
Topical  
Care  
&  
Natural  
Contraction**



**1 - Simple Repairs**



**2 - Grafts**



**3 - Flaps**



*What would you do?*



### Caveats

*55 f*

*fall*

*impact injury*

*lacerations, hematoma*

Active immunopathy puts wounds and autogenous repair at risk.

Patient's severe pulmonary disease prevents any prolonged surgery and anesthesia.

*65 f*

*Wegener's  
granulomatosis*



## Caveats

*52 f*  
*puncture wound*  
*abscess*

No local flaps.

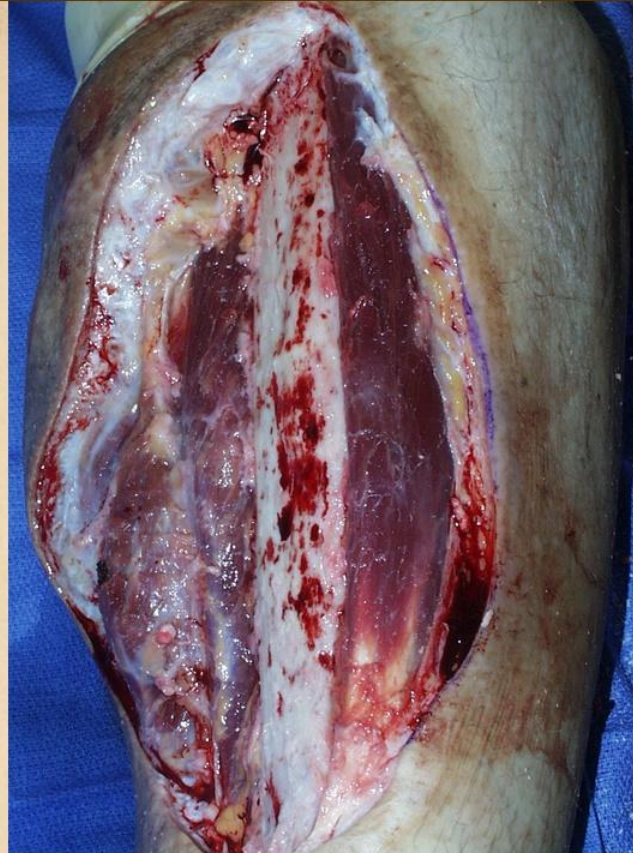
Skin grafts ineligible over bone and joint.  
Potential free flap, into the bypass graft,  
but inadvisable due to cardiovascular risks.

*67 f*  
*ischemic*  
*infarction*



33 m

*machinery versus  
pedestrian  
avulsion –  
degloving*



### Caveats

Skin grafts have failed. Local flaps too small.  
Latissimus f.f. disabling in a working man.  
Omentum and rectus abdominis f.f. prone  
to ventral herniation in an obese patient.  
High risk of any flap thrombosis.



33 m

*venous  
hypertension  
Factor V Leiden*



*39 m*  
*knee fibrosarcoma*  
*thin flaps*  
*radiation*

*64 m*  
*aorto-iliac*  
*occlusive disease*

## Caveats

Any incision on this thigh is prone to pathergy and necrosis.

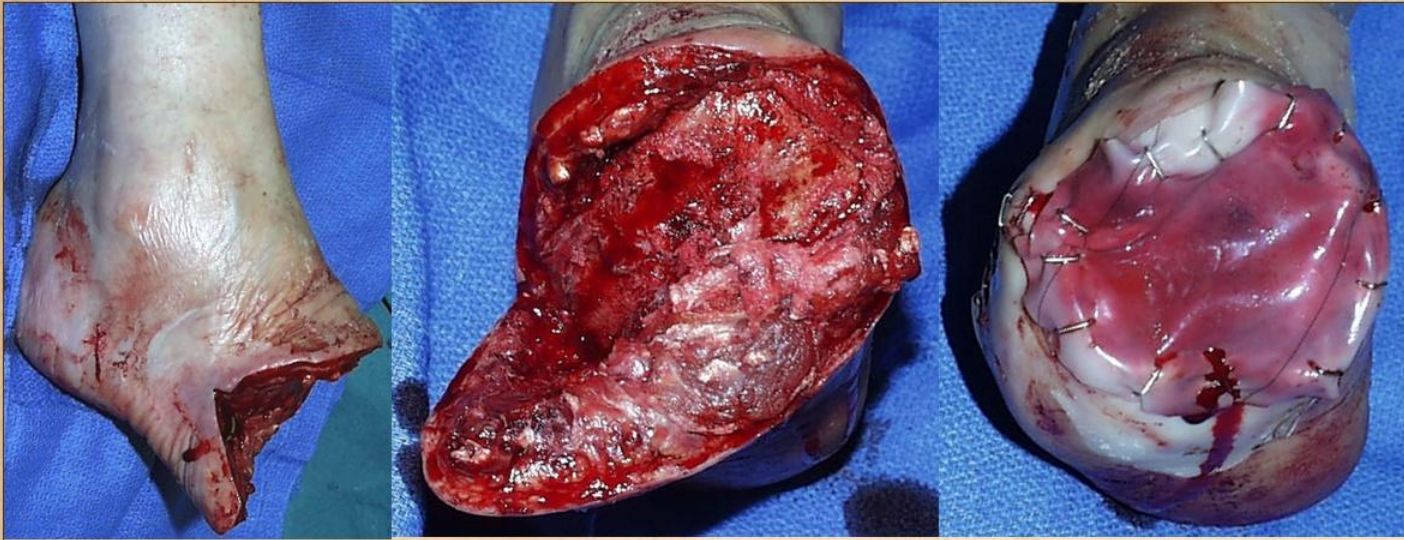
Local flaps and repair will die.

Abdominal flaps (e.g. rectus abdominis) will fail from ischemia

Latissimus free flap contraindicated in a wheelchair bound patient . . .

but moot because there is no connection for a free flap.





*28 m  
traumatic  
crush  
of  
forefoot*



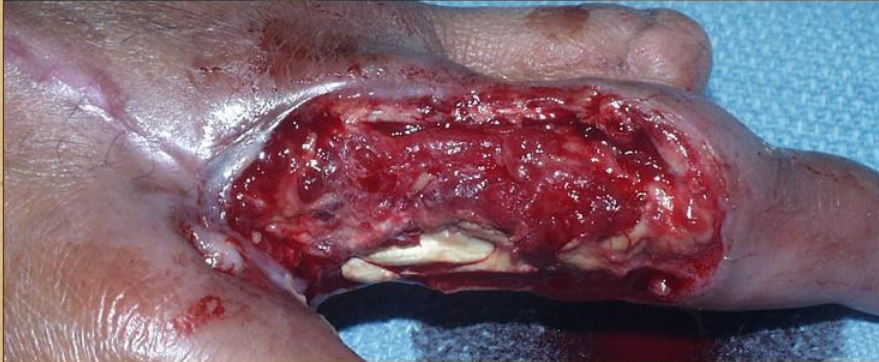
*73 m  
embolic necrosis*

### **Caveats**

No local flaps.

Skin grafts ineligible  
over bone and joint.

Free flaps precluded by vascular  
disease and cardiovascular risks.



### Caveats

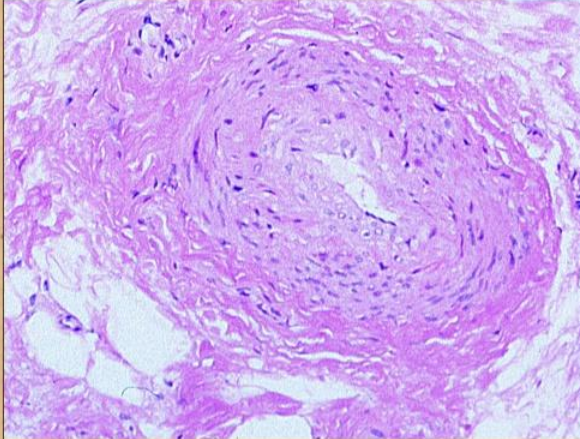
*42 f*  
*human bite*  
*tenosynovitis*

Local flaps are not big enough.  
Flap failure likely due to vascular disease.  
No recipient vessels for a free flap.  
Any incision prone to pathergy and necrosis  
(*why the hand is this way to begin with*).  
Patient cannot afford to lose more of the hand.

*42 f*  
*diabetes*  
*atherosclerosis*



*43 m  
motorcycle injury  
hand abrasion*



*43 m  
scleroderma  
vasculopathy*

### **Caveats**

Any incision prone to pathergy and necrosis.

Flaps will not move properly due to sclerotic skin.

Hand is severely disabled, and cannot afford further loss.

Active immunopathy puts wounds and repair at risk.





# INTEGRA VERSUS CONVENTIONAL SURGERY

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In each of these cases, conventional plastic surgery rules dictated a flap to close exposed essential structures, restore function, or salvage limbs.

*In each, caveats of disease and local anatomy militated against flaps.*

Because Integra can circumvent most of these exceptions,  
*each case had a successful outcome by reconstructing skin with Integra.*

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## Integra: Successful Surgery when other Options Fail

There are problem wounds that conventional surgery cannot solve.

There are times when flaps cannot be done or will not survive.

*Then what?*

*Understanding when a flap should be used, but cannot be used,  
is to understand when Integra should be used in lieu of conventional surgery.*

# Surgery of Repair

## **Axiom 1** **Repair, grafts, flaps.**

*There are three conventional paradigms of wound repair surgery: direct closure, grafts, and flaps.*

## **Axiom 2**

### **All depend on normal wound healing.**

*These paradigms have a common biological basis: all three depend on the physiological process of post-inflammatory reactive wound repair.*

## **Axiom 3**

### **Repairs & grafts need a healthy wound.**

*Simple repairs and grafts succeed when host and target are healthy and wound healing competent.*

## **Axiom 4**

### **Healthy flaps for impaired wounds.**

*If the target is pathological and incompetent to heal, but the host is generally healthy, then repair and grafts will fail, but healthy flaps succeed.*

## **Axiom 5**

### **None work for impaired host.**

*When systemic illness or wound healing pathologies are the basis of the chronic wound, then the classic paradigms of surgery do not work.*



77 m rheumatoid

74 f Sweet's neutrophilic dermatosis,  
rheumatoid, chronic thrombocytosis



# Biological & Clinical Effects of Integra

Single device - dual role:

- 1 - high grade acute artificial skin.
- 2 - then becomes the skin regenerant.

Not alive, tolerates adverse conditions.

“Hides” wound from the host.

Eliminates inflammation.

Controls pathological behavior.

Embryonic dermatogenesis >> dermal equivalent.

No scar.

No contraction.

Tangential hystoconduction.

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## Effects on acute wounds:

Immediate wound closure.

Controls local and systemic effects of inflammation.

Minimizes pathergy and secondary tissue injury.

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## Effects on chronic wounds:

Survives and tames harsh wound conditions.

Eliminates “the wound” and inflammation.

Stabilizes pathological wounds, allows regeneration.



Suppress inflammation.



Control pathological behavior.



Tangential hystoconduction.

## Reasons why flaps, grafts, and other repairs cannot or should not be done.

Persistent disease or inflammation prevent repair.

Local conditions will not support a graft.

Flaps not large enough or may not reach the target.

Local vasculature precludes flap design or execution.

Illness and comorbidities make surgery too risky.

Flaps can sacrifice useful parts and function.

Failed flaps waste anatomy and limit further options.

Inflammation and disease can threaten a flap.

Vascular disease can kill a flap.

Hematological disorders can kill a flap.

Connective tissue disorders and wound pathologies will prevent healing or cause progressive ulceration.

Any disorder which caused the pathological wound will cause comparable problems for the repair.

Similar risks for the donor site, enlarging the problem.

Risk of contractures after grafts.

Normal repair cannot bridge across voids and alloplastics.

## Reasons why Integra can trump the caveats of flaps, grafts, and other repairs.

Not alive; tolerates harsh conditions. Suppresses residual inflammation.

Not alive at the outset - it survives where grafts fail.

Not autogenous; quantity and procurement irrelevant.

Not alive, so it endures ischemia, survives, and is completely safe. \*\*\*

Placing Integra is simple, with no physiological tax.

No autogenous tissue donation.

No autogenous tissues. No failures, no waste.

Not alive, tolerant, suppresses inflammation - so preferred in these conditions.

Circulation-independent, survives where flaps cannot.

Not alive, tolerant of incidental pathology and injury.

Tolerant of incidental pathology and injury; potent ability to withstand effects of connective tissue immunopathy and pathology.

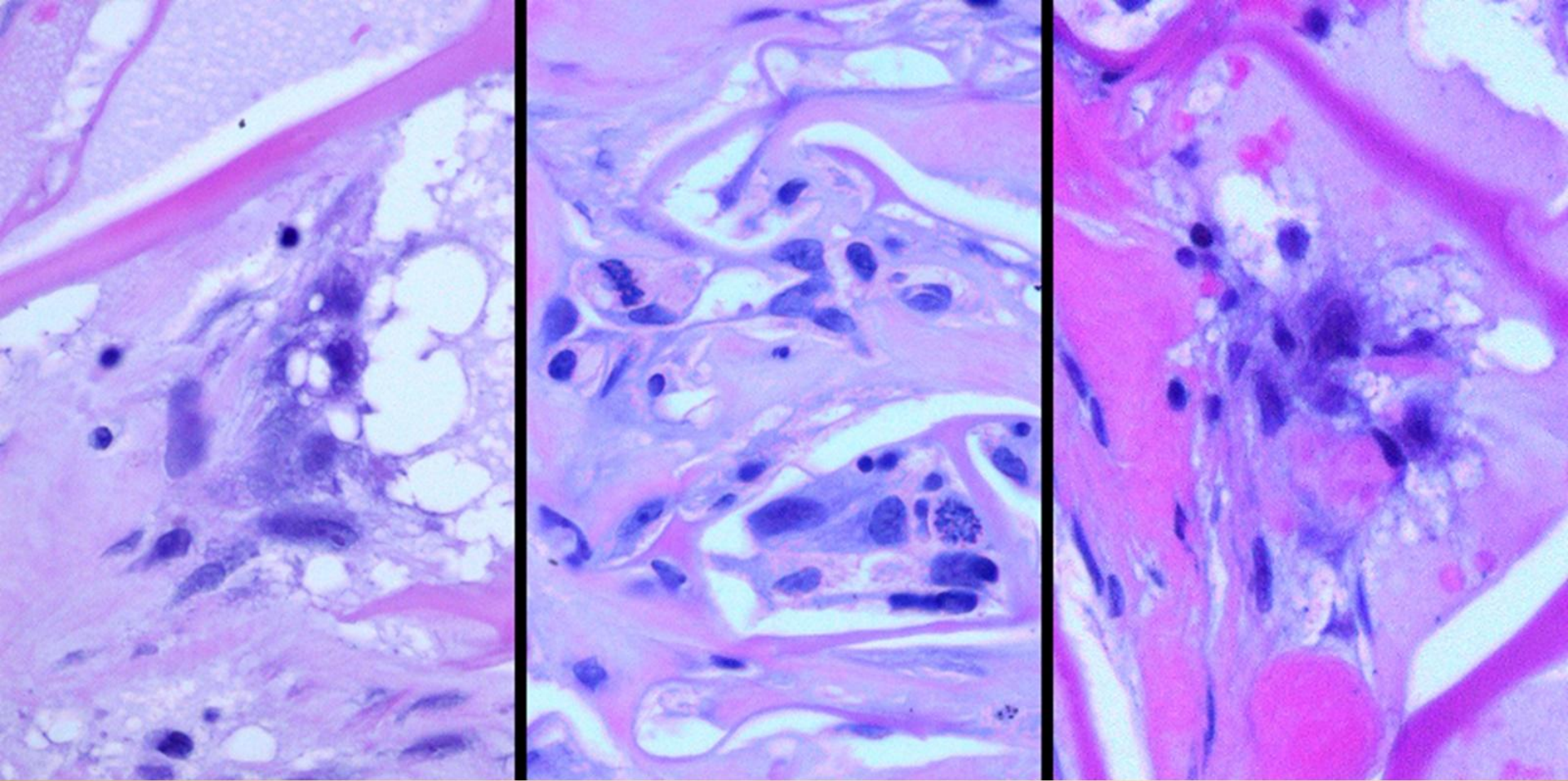
Integra not dependent on normal wound repair physiology - suppresses repair, induces histogenesis.

No donor sites, no risk.

Regenerates dermis, not scar. No contractures.

Tangential histoconduction can bridge voids.





**Syncytial clusters**

## About Surgery . . .

Surgery cures many problems.  
It should be used when appropriate.

For some wounds, conventional  
surgery work, but it might  
also be avoided due to risks  
of failure or risk to the patient.

There are other wounds that  
conventional surgery cannot solve.

## About Flaps . . .

Flaps are the romantic heroes of  
reconstructive plastic surgery. They have  
a pivotal role in the closure of complex wounds.

When the stakes are high for successful  
closure, good flaps get the job done.

... BUT ...

There are times when flaps simply  
cannot be done or will not work.



# Sir Flapalot

**Understanding when a flap should be used, but cannot be used, is to understand when Integra should be used in lieu of conventional surgery.**



LE MORTE DE  
**Flapalot**

## A FOURTH INDEPENDENT PARADIGM OF SURGERY

### *In-Situ Tissue Engineering*

Integra is a distinct paradigm of surgery, in-situ tissue engineering, independent of normal wound healing (unlike repairs, grafts, flaps). It suppresses normal repair, and it initiates embryonic histogenesis.

*It succeeds where conventional modalities fail.*

### *Integra: not an Alternative, the Indicated Option*

In cases presented, Integra was the preferred option, not just because flaps and grafts were ineligible, but because it was the best modality –

*Superior results with less risk.*

### *The Knight of Pathological Wounds*

There are many wounds that conventional surgery simply cannot solve. Flaps remain the heroes of reconstructive plastic surgery. But for closing problem wounds,

*Integra is the modern Excalibur.*



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Late reconstruction.





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# INTEGRA COLLAGEN-GAG MATIX

## BENEFITS FOR TRAUMA

Burns

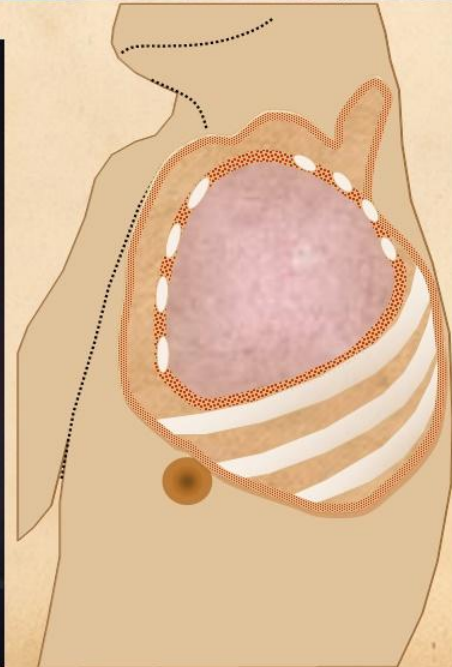
Fasciitis

Degloving

Compartment syndromes















*Random flap*



**Integra on flap donor sites,  
not the primary problem.**



*Axial flap*

# Benefits & virtues

## Acute care of patient:

- Rapid closure of wound.
- Mitigation of inflammation.
- Mitigation of fluid losses, pain, etc.
- Quickly applied.
- No donor site or additional trauma.
- No risk to patient.
- Does not interfere with or compromise subsequent care or decisions.

## Acute preservation & closure of wound:

- Prevent wound pathergy.
- Avert secondary necrosis & inflammation.

## Acute preemptive reconstruction:

- Faster resolution of wounds & scars.
- Avoid contractures.
- Joint mobilization sooner & more effective.
- Faster more effective rehabilitation.
- Better cosmesis.
- Prevent late reconstruction.

## Late reconstruction:

- Correction of contractures.
- Correction of skin quality.

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חנוכה

