Abstract:
A fifty six year old male sustained acid burns to his right upper limb, resulting in a raw area over dorsum of hand and extensor aspect of distal forearm and flexor aspect of distal forearm. During an episode of secondary haemorrhage the radial artery was ligated. The raw area was covered by a split quadrant flap with the groin component for flexor aspect of distal forearm and abdominal component for dorsum of hand and extensor aspect of distal forearm.

Keyword: Aqua regia, Acid burns, Complex hand defects, Quadrant Flap (Inferiorly based abdomen and Groin Flaps), Split Quadrant Flap.

Introduction:
Acid burns are common industrial accident. When upper limb is affected mostly the defect is big and complex affecting both volar and dorsal aspect exposing the tendons. Most of the time the arteries are also affected by the injury and thereby the safety of free flap becomes doubtful. Resurfacing such defects entirely with distant flaps requires careful planning.

Case Report:
Fifty six year old male working as a Goldsmith came with accidental acid burns of the right hand and distal forearm at his work place. He took initial treatment at a private hospital and was referred to our plastic surgery department for further management.

Clinical Examination:
Full thickness burns involving dorsum of hand and circumferentially both extensor and flexor aspect of distal forearm with second degree superficial burns involving the fingers, thumb and palm. Hand was oedematous. The finger & thumb movements were restricted and painful. Active wrist movements were not present. The hand was viable though pulsations were not felt through wound. No other injuries were present.
**Management:**
Patient was investigated. On the third day from injury first debridement was done. The eschar and necrosed soft tissues were debrided. Patient had daily dressings, antibiotics and analgesics.

**INITIAL DEBRIDEMENT - PALM:**

**INITIAL DEBRIDEMENT - DORSUM**
Patient developed secondary hemorrhage on the 7th post debridement day, and radial artery was ligated. Further wound debridement was done on day 10 and the defect size was measured. The defect size was 14 X 6 cm on the extensor aspect of hand and forearm & 6 X 6 cm on flexor aspect of distal forearm exposing intact tendons in both sides. The defect is peculiar and complex involving the dorsum of hand and circumferential skin loss of distal forearm. To resurface this complex defect combined inferiorly based abdominal flap and groin flap (Lower quadrant abdomen) was planned. Quadrant flap (inferiorly based abdominal and groin flaps) raised superficial to external oblique aponeurosis & anterior rectus sheath.
The flap is supplied by superficial circumflex iliac, superficial inferior epigastric and superficial external pudendal vessels. This quadrant flap was split such that the groin component contain superficial circumflex iliac vessels and the abdominal component contain superficial inferior epigastric and superficial external pudendal vessels.

MARKING OF FLAPS

SPLIT QUADRANT FLAP

The abdominal part of flap was inset to the dorsum of hand and extensor aspect of forearm and the groin part was inset to flexor aspect of the distal forearm by twisting the flap to 180 degrees inwards. A small residual defect on the extensor distal forearm and the secondary defect were resurfaced with Split thickness skin graft.

FLAP INSET
WELL SETTLED FLAP

WELL SETTLED FLAP
The flap was divided at 3 weeks and inset given. Flaps settled well and donor site healed without any complication. Active and passive mobilization exercises started. Patient was followed up for one and half months after division. He had active range of movements of 0 to 60 degrees in metacarpo phalangeal and inter phalangeal joints. The passive range of movements were 0 to 80 degrees in both metacarpo phalangeal and inter phalangeal joints. Sensation was normal with two point discrimination of 6 mm in fingers and 4mm in thumb.

**Discussion:**
Aqua regia (Latin for "Royal Water") is a solution of nitrohydrochloric acid. The traditional solution is comprised of a 3:1 mixture of hydrochloric acid and nitric acid, respectively. It is commonly used to remove substrates from noble metals such as gold, platinum and palladium, particularly in microfabrications and microelectronics labs. Aqua regia solutions are extremely corrosive and may result in explosion or skin burns if not handled with extreme caution. There is no documented report of aqua regia causing deep burns or secondary haemorrhage.

Various combination of flaps have been reported to cover such dorsum and volar defects. In 1981, Watson and McGregor reported the combined use of a groin and tensor fascia latae myocutaneous flap to cover a completely degloved hand. Koncilia et al described the combined use of a groin flap and a pedicled Scarpa’s flap (SIEA) for circumferential finger burn defects. In 2008, Choi and Chung has reported the use of pedicled groin and superficial inferior epigastric flap to cover dorsum and volar defects of hand. In their design they have left part of skin and closed each defect primarily. In our flap design the entire right lower quadrant of abdomen was raised and split and used to resurface the defect.

**Conclusion:**
Acid burns always cause full thickness burns resulting in complex hand and forearm defects. These complex defects of hand and forearm not amenable for coverage by usual conventional flaps. The split quadrant flap covers both extensor and flexor aspects of the hand and forearm.

**References:**
1 Watson ACH, McGregor JC. The simultaneous use of a groin flap and a tensor fasciae latae myocutaneous flap to provide tissue cover for a completely degloved hand. Br J Plast Surg 1981;34:349–52.
