

Use of Intravital Dyes in the Assessment of Deep Burns.

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EARLY closure of deep dermal burns has been engaging the minds of workers for many years.

In deep burns, to achieve early closure is not always easy to practice because of many factors, one of them being the difficulty in determining the depth of necrosis.

In order to determine the depth of burn injury, various tests have been described, e.g. the pin prick test and the hair-epilation test etc. The analgesic areas are regarded as the zones of the deep dermal burns. No doubt, the clinical test is valuable but it goes without saying that it is not accurate. Patey and Scarff (1944) tried to distinguish between the normal collagen from heat altered one, by painting the surface of burn with a modified VAN-GIESON'S Stain. Unfortunately surface staining gives little information about the underlying dermal depth and hence this test also did not cut much ice. Dingwall (1943) and a host of other workers since then have injected solutions of fluorescein intravenously and then viewed the skin of the patient under ultraviolet light in a darkened room. Though this gives valuable information but it is rather a cumbersome method, and difficult to carry out in an operation theatre at the time of excision of a major burn.

Tempest (1961) has used intravital dyes

such as Disulphin Blue, and Keton Fast Green in 150 cases to investigate the depth of burn with commendable results. The advantages of these dyes are that they can be injected in the operation theatre when the patient is anaesthetised and they stain the tissues with good vascularity within seconds leaving avascular areas unstained. They do not have any toxicity and they are excreted within 24-48 hours completely mostly through the kidney. The dyes are not found to alter the body metabolism in any way.

The present work has been undertaken to find out the value of aforesaid dyes in the assessment of burns within the confines of facilities available in our hospitals.

Materials and Methods

Twenty cases of burns of varying extent and degree admitted in the surgical ward of Patna Medical College Hospital were selected for the present study and were treated by early (usually on the 4th day) excision of areas of deep burn with the help of staining by intravital dyes followed by primary grafting. To act as control another twenty cases were treated conservatively and were grafted after natural separation of slough, usually in the third week.

Surgery was done under general anaesthesia, with intravenous fluid and blood trans-

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fusion. Following due aseptic care, Disulphin Blue was injected slowly into the tubing of the intravenous infusion. The dosage were as follows :

Dosage : 0.25ml to 0.5ml/kg. body weight, roughly :

Age groups	Dose (ml)
Children up to 3 years	5-10
3-10 years	10-15
10-20 years	20
over 20 years	20-40

Changes in the colour of the skin were first seen within 30-60 seconds in those areas with the most active blood supply i. e. the lips, face, and ears. Complete body staining was generally established in 5-10 minutes. Whole body except the deep dermal burn areas was stained blue. Thus, the areas for primary excision were clearly demarcated.

The areas of superficial partial thickness loss were demarcated by the appearance of closely packed green stipplings while deep partial skin loss was indicated by sparse stipplings. The latter was tantamount to full thickness loss of skin. The slough was now excised and the raw areas were immediately closed with auto-genous skin grafts where ever possible. In larger areas for which auto-grafts were not available in sufficient amount alternate strips of homografts taken from willing maternal relatives were used along with strips of autografts. Operative fields were covered with Jelonet and additional cotton and gauze dressings anchored by sterile bandages. The blood loss during operation was made up by adequate transfusion.

Technical Data

Disulphin-Blue is the mono-sodium salt anhydrous -4 : 4' bisdiethyl aminotri-phenyl methanol 2'', 4' disulphonic acid (sulphan)



Appearance after i/v Injection of Disulphin blue.

- (i) Yellow and Yellow brown area is deep burns.
- (ii) Deep Green area is superficial burn.
- (iii) Light Green areas are of moderate depth burns.
- (iv) Blue area is unburnt or very superficial burns.

Table 1

Showing incidence of percentage of burn in the present series of study

Extent of burn in percentage	Early excision & grafting		Conservative treatment with late grafting	
	Number	Percentage	Number	Percentage
Below 10%	2	10%	2	10 %
10—20 %	6	30%	4	20 %
20—30 %	4	20%	5	25 %
30—40 %	6	30%	4	20 %
40—50 %	2	10%	2	10 %
above 50 %	Nil	0%	3	15 %
Total	20	100%	20	100 %

Table 2

Showing average time of hospitalization in weeks

Extent of burn (percent)	Early excision & grafting		Conservation treatment with grafting (late)	
	No. of cases	Stay in weeks	No. of cases	Stay in weeks
Below 10%	2	2.2	2	3.1
10—20 %	6	5	4	6.5
20—30 %	4	3.2	5	7.8
30—40 %	6	6.1	4	12.0
40—50 %	2	6.5	2	12.5
Above 50 %	Nil	Nil	1	15.0
			2	Died.

Table 3

Showing incidence of development of early complications

Complication	Early excision & grafting		Conservative treatment with late grafting	
	No.	%	No.	%
Infection	8 (Mild)	40	16 (severe)	80
Pyrexia	14	70	18	90
Anorexia	20	100	20	100
Progressive loss of weight	12	60	16	80
Anaemia & Hypoproteinaemia	10	50	16	80

Table 4

Showing incidence of late postburn complications

Complication	Early excision series		Conservative treatment with late grafting, series.	
	No.	%	No.	%
Postburn contracture	1	5	5	25
Hypertrophic scar and keloid	5	25	9	45
Unstable Scar	2	10	4	20

pecially prepared by the Research Division of Imperial Chemical Industries (I. C. I.) Pharmaceutical Ltd. and supplied already sterilized as 6.2% solution in 10ml. ampoules.

Discussion

The persual of the two groups of cases showed that in the series in which early excision and grafting was practiced the patients required 30% to 50% less time for healing. Complications such as infection with accompanying pyrexia, loss of weight, anaemia and hypoproteinaemia were more frequent in conservative series, where there was 10% mortality. In early excision series the complications of infection were less frequent or less intense and there was no mortality. The incidence of postburn contracture and hypertrophic scars etc. was also many fold more in the conservative series. Hence, one can conclude that it is worth while practising early excision and grafting with the help of

injection of intravital dyes as it lessens the early and late suffering of the patient along with a reduced stay in the hospital, without increasing the mortality.

Summary

1. Twenty cases of burns of varying extent were studied in which early excision of areas of deep burn with skin grafting was practised. The deep burn was outlined by Disulphine blue.

2. Another 20 cases were studied in which conservative treatment was given and grafting was done in 3-4 weeks after injury when the slough had separated.

3. It was observed that in early excision series the period of hospitalization was 30 to 60% less and development of complications was 20-30% less. The mortality was also found to be nil whereas there was 10% mortality in conservative series.

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