

A Study of Complications of Intravenous Therapy in Children

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INTRAVENOUS DRUGS and fluid therapy is commonly used in a hospital set-up. Its tremendous utility is beyond doubt and the complications are also well-known. However, the frequency as well as the types of complications encountered depend on many factors.

A study was conducted in the Paediatric Department of Choithram Hospital and Research Centre, Indore. The study aimed at finding out the frequency and types of complications in our hospital setting; determining the role of various factors in the causation of these complications; and analyzing the preventive procedure to minimize complications during I. V. Therapy.

The study was conducted due to the occurrence of serious complications like blistering, thrombophlebitis, necrotic ulcers, abscess formations and septicemia in the preceding months.

Material and Methods

Fifty consecutive cases, which required intravenous drugs and fluid therapy, were studied in aseptic nursery and paediatric intensive care unit. A detailed case data, including age, sex, weight, diagnosis, drugs and fluid given, were maintained. Site of I.V. therapy, types of needle/camula used and use of heparine lock were also recorded. Each site was observed daily for swelling, redness, thrombophlebitis, infections and other complications. I.V. site was changed when significant oedema, redness, tenderness or other complications appeared or otherwise. It was customary to change I.V. sets within three to five days and usual aseptic precautions were taken while putting up an I.V. line and giving I.V. injections. Thereafter, the findings were analyzed.

In all cases, gamma irradiated intracath and I.V. sets (without microbiological filter) were used. Sterile commercial fluid and drugs were used. Fresh autoclaved syringes were employed for all injections. Heparine lock solutions was made by standard aseptic method, i.e. 5,000 units of heparine in 500 ml. of normal saline, and (5-10 units) solutions was used for heparine lock.

TABLE I

Basic significant data of the study

S.No	Paediatric I.C.U.	Septic Nursery	Aseptic Nursery	Total
1. No. of cases	20	11	19	50
2. No. of I.V. sites	45	28	47	120

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3. Total durations of I.V. therapy in days	166	118	221	505
4. Average duration & I.V. sites lasted	3.7	4.21	4.7	4.21
5. No. of sites having significant complications	9	5	Nil	14
6. Complications per cent I.V. sites	20%	18%	Nil	12%

* Significant complications included grade III edema, blisters, thrombophlebitis, abscess, etc.

Grade I edema - included only the site (local).

Grade II edema - whole site and little large area.

Grade III edema - whole part (whole limb).

Duration of Using an I.V. site: It is generally recommended that I.V. sites should be changed after 48-72 hours. In this study, 69 sites were used beyond three days, 31 sites were used beyond five days, 12 sites were used beyond seven days. In view of limited number of veins available in young children, it is unwise to discard an I.V. site every 48-72 hours. Prolonged use of an I.V. site was not associated with any undue significant complications in this study. This possibly was due to the fact that daily careful observation of the site was made during the study and sites changed when edema and redness appeared.

I.V. site lasted longer in aseptic nursery compared to paediatric intensive care unit and septic nursery. This suggests the very important role of aseptic precautions in preserving an I.V. site. The complication rate has been minimum in cases admitted in aseptic precautions for I.V. therapy taken in this unit. This fact that I.V. lasted longer in new borns and pre-terms suggests that they are more tolerant of the same. Another possibility is that they have less power to produce inflammatory response leading to vascular problems.

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TABLE II

Number of cases according to duration an I.V. site lasted

S.No.	Duration	Paediatric I.C.U.	Septic Nursery	Aseptic Nursery	Total
1.	Up to 3 days	24	14	13	51
2.	3 to 7 days	19	10	28	57
3.	Over 7 days	2	4	6	12
	Total	45	28	47	120

The life of I.V. has been best at the elbow site. However, complications rate has been higher at foot and ankle site. This suggests that foot and ankle site can be used, but should not be the preferred site for putting up an I.V. line.

TABLE III

Number of significant problems and per cent (X) according to the site of I.V.

S.No.	Total No. of I.V. sites	Paediatric I.C.U.	Septic Nursery	Aseptic Nursery	Total
1.	Elbow (54)	3/15 (20%)	2/15 (13%)	0/24	5/54
2.	Hand & Wrist	4/21 (19%)	1/8 (13%)	0/17	5/46 (11%)
3.	Foot & Ankle	2/9 (22%)	2/5 (40%)	0/5	4/19 (21%)
4.	Umbilical (1)	—	—	—	—
	Total (120)	9/45 (20%)	5/28 (18%)	0/48	14/120 (21%)

TABLE IV

Average duration in days site lasted

S.No.	Sites	Paediatric I.C.U.	Septic Nursery	Aseptic Nursery	Total
1.	Elbow	3.8	4.67	5.17	4.65

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2.	Hand & Wrist	3.33	3.5	4.76	3.89
3.	Foot & Ankle	4.33	4.0	3.0	3.89
4.	Umbilical	—	—	—	—
	Total	3.69	4.21	4.70	4.21

The other factors that were associated with short-lined I.V. sites were use of mannitol, crystalline penicillin and chloroquine. Use of properly diluted sodabarb and calcium gluconate did not spill the site early. Majority of the complications were seen when I.V. fluids were being given and not when only I.V. drugs were given using heparine lock. The life of an I.V. was also less when fluids were given. Possibly this was due to fluids load. However it would be worthwhile to study the effect of low dose heparine along with fluids on the complications rate and the life of I.V. site. The use of heparine for central venous lines and arterial lines is already well established.

TABLE V

Sites having number of significant problems and percentage according to the type of therapy

S.No.	Type of therapy	Paediatric I.C.U.	Septic Nursery	Aseptic Nursery	Total
1.	Fluids & Drugs both together	8/31 (26%)	5/15 (33%)	0/25 (0%)	13/71 (18%)
2.	Drugs along with heparine lock (No. of fluids)	1/10 (10%)	0/12 (0%)	0/12 (0%)	12/40 (2.5%)

TABLE VI

Average duration in days according to type of therapy

S.No.	Type of therapy	Paediatric I.C.U.	Septic Nursery	Aseptic Nursery	Total
1.	Fluids & Drugs both together	98/31	57/15	97/25	252/72
2.	Drugs signs with heparine lock (No. of fluids)	39/10 (3.9)	48/12 (4.0)	100/18 (5.56)	187/40 (4.68)

We had also encountered some serious complications earlier. Therefore, whenever a single such complication like throm-

bophlebitis and abscess occurs one should search for the cause and take preventive steps. A continuous surveillance on the standard of I.V. care should also be kept.

Minor problems like redness and edema around the site commonly observed. This was due to the fact that we did not change the site every 72 hours or so, but utilized it as long as possible in an attempt to save vein for prolonged I.V. therapy.

Conclusion

(1) To minimize the complications following an I.V. therapy, the following steps should be taken:

- a). Adequate aseptic precautions must be taken while putting up an I.V. line subsequently.
- b). I.V. site should be observed frequently for swelling, redness, and tenderness.
- c). It is better to use transparent adhesive.
- d). Foot and ankle should not be the preferred site.

(2) It is safe to use an I.V. site for longer than recommended 48-72 hours provided part is immobilised properly; adequate precautions and observations are undertaken.

(3) Drugs signs (with heparine lock) can be safely given. It is not necessary or desirable to keep fluids running for this purpose.

(4) Use of low dose heparine for maintenance of site and for reducing complications during I.V. fluid therapy needs further study.

P.S.

Recently we faced another problem of septicemia despite using fresh diluted heparine. Nowadays, we are using normal saline, instead of heparine for presenting an I.V. site. It is found successful in children.

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