Section: Dermatology

Case Series

POVIDONE-IODINE INDUCED POST-SURGICAL CONTACT DERMATITIS: A CASE SERIES OF 40 PATIENTS

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ABSTRACT

Povidone-iodine (PVP-I) is an antiseptic solution that is widely used for disinfecting skin during various surgical procedures. PVP-I induced post-surgical contact dermatitis can occur at sites distant from incision site due to pooling of PVP-I in these areas during surgery. We report 40 cases of post-surgical contact dermatitis due to PVP-I which presented to our department in a period of 2 years. All the patients had lesions at sites away from surgical site. Free iodine is released from PVP-I as long as it remains liquid which explains the occurrence of skin lesions at sites where pooling of PVP-I occurs. Surgical sites are spared because PVP-I is dried up prior to surgery. Our case series highlights the importance of early identification and management of this dermatitis and thereby reducing patient morbidity. We also recommend to completely dry the PVP-I before draping the patient prior to surgery and thus preventing pooling of PVP-I in dependent sites.

INTRODUCTION

Contact dermatitis (CD) refers to the inflammation of skin caused by contact with an external agent (physical/chemical or biological). Depending on the pathophysiology, CD can be broadly classified as irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD).[1]

ACD is an eczematous reaction that occurs as an immunological response following exposure to a substance to which the immune system has previously been sensitized. ICD results from single, sudden exposure to an irritant and caustic chemicals.[2]

Povidone-iodine (PVP-I) solution is used as a surgical paint worldwide. It is a very effective microbicide. A 10% PVP-I solution contains 10% bound iodine and 1% available iodine.[3]

Due to less free iodine concentration within povidone-iodine, irritation to the skin occurs less frequently due to short contact.[4]

Although PVP-I is considered to have a low irritant potential, isolated cases of severe skin injury have been reported with use of PVP-I in the surgical setting. In this case series we report 40 patients who developed irritant contact dermatitis to PVP-I post operatively at sites distant from the surgical sites where PVP-I have suspected to be pooled during the surgical procedure. PVP-I dermatitis is easily preventable by avoiding pooling of solution and prolonged contact with skin

CASE SERIES

We came across 40 cases of ICD in post-surgical patients in two years duration from July 2022 to June 2024. Among the 40 cases, 10 were males and 30 were females with age ranging from 8 years to 89 years. The age of patients, clinical presentation and type of surgery are described in table 1. Most of the cases [19] followed total abdominal hysterectomy and bilateral salpingo-oopherctomy [TAH and BSO]. There were 4 cases following caesarean section and 7 cases following orthopaedic surgeries. There were also cases of ICD following thyroidectomy, hernioplasty, laparoscopic nephrectomy, myomectomy, breast lump excision and percutaneous coronary intervention. Patients presented with skin lesions during post-operative day 1 to day 4 with majority presenting on day 2. All the patients presented with pruritic erythematous plaques with some patients having vesicles in addition. All the cases had lesions at site distant from surgical site. None of the patients had skin lesions at the site of

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incision. All the patients that presented following caesarean section and TAH and BSO had erythematous plaques involving buttocks, lumbar area and thighs. One patient presented on post-operative day two with erythematous plaque over upper back following thyroidectomy. A 44-year-old male presented with erythematous plaques over abdomen on post-operative day two following endoscopic lumbar canal decompression surgery done for intervertebral disc prolapse. All the patients were managed with antihistamines and topical steroids. The antiseptic used in all cases during surgery was PVP-I solution [Hand shield PV 10% by Microgen®]. It contains 10% w/v of povidone iodine with 1% available iodine [yields free iodine concentration of 1 ppm] and excipients. Patch test were done with PVP-I 10% using Finn chamber technique in 5 patients and showed negative results. Repeated open application test [ROAT] were also done in these 5 patients which were also negative. In one patient we performed a patch test using gauze soaked in PVP-I 10% solution under occlusion, after 24 hours patient developed pruritus and erythematous papules at the site which indicated an irritant reaction. But ROAT in this patient yielded a negative result.

Figure 1- Patient 3, erythematous plaques over buttocks and thighs.

Figure 2- Patient 10, linear erythematous plaque with vesicles over buttocks

Figure 3- Patient 17, erythematous plaque over upper back

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Figure 4- Patient 23, erythematous plaque over left scapular area

Figure 5- Patient 36, erythematous plaque over abdomen

Figure 6- Patch test site showing irritant reaction

Table 1: Clinical data

Patient	Age /sex	Surgical procedure	Clinical pattern
1	36/F	LSCS	Erythematous plaque on buttocks
2	49/F	TAH + BSO	Erythematous plaque in a linear pattern on the sides of buttocks
3	48/F	TAH+ BSO	Erythematous plaque over buttocks and thighs in a linear pattern
4	36/M	PCI	Erythematous plaque over upper chest
5	46/F	TAH +BSO	Erythematous plaque over posterior aspect of thighs
6	41/F	TAH + BSO	Erythematous plaque over posterior aspect of thighs
7	45/F	TAH + BSO	Erythematous plaque over left lumbar area and the posterior aspect of left thigh
8	44/F	TAH+ BSO	Erythematous plaque over the posterior aspect of right buttock
9	42/F	TAH+BSO	Erythematous plaque over buttocks and posterior aspect of left thigh
10	35/F	LSCS	Erythematous plaque with few vesicles over the buttocks

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11	49/F	TAH+ BSO	Erythematous plaque over the lateral aspect of buttocks
12	34/F	Myomectomy	Erythematous plaque over the lateral aspect of buttocks
13	52/M	Laparoscopic appendicectomy	Erythematous plaque over flanks
14	24/F	LSCS	Erythematous plaque over lower back and buttocks
15	23/F	LSCS	Erythematous plaque over buttocks
16	66/F	Arthroscopic rotator cuff repair - right	Erythematous plaque over right scapular area
17	39/F	Arthroscopic rotator cuff repair - left	Erythematous plaque over left scapular area
18	49/F	TAH+BSO	Erythematous plaque over buttocks
19	49/F	TAH+BSO	Erythematous plaque over buttocks
20	30/M	Arthroscopic meniscal balancing – left	Erythematous plaque over lower 1/3rd of left thigh
21	52/F	TAH+BSO	Erythematous plaque over buttocks and posterior aspect of thighs
22	36/F	Excision of lump on right breast	Erythematous plaque studded with numerous vesicles present over upper back
23	8/M	Implant removal from left arm	Erythematous plaque over left scapular area
24	45/F	TAH+BSO	Erythematous plaque over buttocks
25	89/M	Fracture femur open reduction & internal fixation - left	Erythematous plaque over buttocks
26	43/F	TAH+BSO	Erythematous plaque over buttocks and lower back
27	43/F	TAH+BSO	Erythematous plaque over buttocks and posterior aspect of thighs
28	53/F	Laparoscopic nephrectomy -left	Erythematous plaque over right flank and right thigh
29	44/F	TAH+BSO	Erythematous plaque over buttocks studded with vesicles
30	65/M	Inguinal hernioplasty – right	Erythematous plaque over posterior aspect of both thighs
31	70/M	Right inguinal hernioplasty and left orchidectomy	Erythematous plaque studded with vesicles over posterior aspect of both thighs
32	58/M	Thyroidectomy	Erythematous plaque over upper back
33	48/F	TAH+BSO	Erythematous plaque over buttocks
34	41/F	TAH	Erythematous plaque studded with vesicles over right buttock
35	66/M	Hemiarthroplasty right hip	Erythematous plaque over left flank
36	44/M	Endoscopic lumbar canal decompression	Erythematous plaque over abdomen
37	57/F	Laparoscopic mesenteric cyst excision	Erythematous plaque over back
38	62/F	Staging laparotomy with pelvic floor repair	Erythematous plaque over buttocks and posterior aspect of thighs
39	49/F	TAH+BSO	Erythematous plaque over buttocks
40	48/F	TAH	Erythematous plaque over buttocks and posterior aspect of thighs

DISCUSSION

In a two-year period, we encountered 40 post-operative patients referred to our department with ICD affecting areas distant from the surgical sites. Interestingly the surgical site was spared in all these cases. Pre, intra and post operative procedures were thoroughly analysed after discussing with surgeons. 10% PVP-I solution was the only possible etiological agent for causing irritant contact dermatitis in all these patients.

10% PVP-I solution is an iodophore that contains iodine and polyvinylpyrrolidone as antiseptic agents.[4] PVP-I contains iodine in free form and inert form.[5] The free form iodine has oxidative capacity resulting in its bactericidal effect.[4] The free form of iodine can cause skin irritation due to its oxidative capacity but due to its low concentration in PVP-I, the chance for skin irritation is less. But when PVP-I remains in liquid form for prolonged duration, the oxidative effect of free iodine continues and skin irritation can occur.[5] This explains the occurrence of ICD at distant site of surgical incision where pooling of PVP-I occurs and due to this, skin is exposed to prolonged period of PVP-I in liquid form resulting in chemical damage to the skin. Surgical site is spared as the solution is wiped off before the surgery.[3]

Borrigo et al. from Spain reported 27 cases of ICD in post-operative patients at sites away from surgical incision. Among these cases only one patient showed a positive patch test to 10% PVP-I, but repeated open application test in this patient was negative.[3] Ijima

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et al. from Japan reported 19 cases of similar clinical features. Patch test using 10% PVP-I were done on patients as well as controls and both the groups showed a positive reaction which indicates that the lesions were due to ICD and not due to ACD.[4] Rao et al from USA reported a case of dermatitis due to povidone iodine in a post caesarean section patient at the site of incision. In this patient povidone iodine was not wiped off before dressing the wound as a method of infection prophylaxis which explains the pooling of povidone iodine resulting in contact dermatitis.[6] de la Cuadra-Oyanguren et al reported 7 cases of contact dermatitis caused by povidone iodine in post-operative patients out of which 5 patients had dermatitis at surgical site and 2 patients with skin lesions at distant site.[7] Rees et al reported a case of an 8 year old boy presenting with ICD to povidone iodine on buttocks post appendicectomy surgery.[8] We also had an 8 year old boy with ICD over left scapular area following implant removal from left arm. Osman Khan et al reported a severe case of ICD due to povidone iodine in an 18-year-old girl presenting clinically like a second-degree burn.[9] Two cases of contact dermatitis due to povidone iodine were also reported following dental extraction with lesions over face 24 hours post procedure.[10]

Due to gradual release of iodine from PVP-I solution, standard patch test procedure using closed chamber may not yield a uniform result which explains the inconsistent results of patch test in previous studies.[11] This may be the reason for the negative patch test in 5 of our patients when done using conventional closed chamber technique and irritant reaction in one patient tested using gauze soaked in 10% PVP-I solution under occlusion. Free iodine is responsible for the irritant reaction and it is released when PVP-I is in a liquid state under occlusion. When tested using repeated open application method PVP-I 10% solution had a low irritant potential which explains the negative result for ROAT.[11]

It is also suggested that contact dermatitis due to PVP-I also has an allergic mechanism apart from irritant effect .PVP-I becomes a complete antigen only after it gets attached to transport proteins in skin which also requires occlusion for a certain amount of time.[7] It was also reported that patch test with PVP-I in water had a more intense irritant reaction compared to PVP-I in petrolatum.[7] The repeat open application test yielded negative tests because it dries up on the skin and without occlusion an irritant reaction is not produced.[3,7]

CONCLUSION

We are reporting 40 cases of ICD due to povidone iodine solution in post-surgical patients from our institution. It may be a common condition with some cases left undiagnosed. We recommend that clinicians should be sensitised to this condition. Early identification and management can significantly reduce the severity of this reaction. It is recommended to avoid pooling of PVP-I on dependent surfaces during surgery and to ensure that it is completely dry before draping the patient prior to surgery. Future use of iodine compounds need not be avoided in these patients as these reactions are irritant in nature.

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