



Successful treatment of abscess in a domestic Asiatic elephant (*Elephas maximus*): A case study at Deogarh District of Odisha, India

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ABSTRACT

A mahout brought one female domestic elephant from Banaras into Odisha during August 2013 as a routine annual movement. It was suffering from two huge abscesses, one at right foreleg and the other at left foreleg posterior to knee joint having two openings with oozing out of pus and bloody fluid. The animal was anorexic, dull and limping. As reported by the mahout, both the wounds were chronic in nature and about 10 years old. It had been treated 12 times at number of veterinary dispensaries of many different states without much improvement. Rather, in course of time, it was aggravated. Later, the elephant was presented to Veterinary Dispensary, Reamal of Deogarh District on 28.08.2013. First week, magnesium sulphate (MgSO₄) powder was introduced into both abscesses and flushed with luke warm potassium permanganate (KMnO₄) and followed by dressing. Combination of antibiotics like Penicillin G Sodium and Streptomycin were administered. Injections like meloxicam as analgesic, prednisolone as steroids and hivit and neuroxin-M as supportive therapy were administered intramuscularly including oral vitamin and liver supplementation. There was no improvement because of the presence of hard fibrous mass. Further, copper sulphate (CuSO₄) was incorporated into the wound cavities twice which putrefied and degenerated the same that were embedded deep into the cavities. From 02.09.2013 to 05.09.2013, during the usage of CuSO₄ antibiotics and other treatments were dropped. From 06.09.2013 to 08.09.2013, repeat usage of CuSO₄ was undertaken to clear the remaining hard tissues. From 09.07.2013, wound management was taken care of including minor surgical interventions. New generation antibiotics like Intacef-Tazo (combination of Ceftriaxone and Tazobactam) in requisite doses were administered intravenously from 09.07.2013 to 17.07.2013 including supportive therapies as recommended earlier. In addition, fluid therapy, metrogyl and local antibiotics like chloramphenicol were used. During the process, proper debridement of fibrous tissue was done. Cleansing was undertaken with normal saline mixed with 10% povidine iodine. With the extensive treatment protocol maintained from 2nd to 3rd week of September 2013 with continued dressing, there were fast healing and the wound size was drastically reduced. By 3rd week left wound was almost healed and right wound was reduced to 4" size. From 3rd to 4th week, after necessary cleaning of the wound by normal saline (NaCl) mixed with 10% povidine iodine, chloramphenicol powder was applied 2-3 times daily with spraying of fly repellent all around the wound. By 4th week both the wounds were healed up with smaller swellings and circular white scar marks. The elephant restored normal feeding and movement.

Key words: Abscess, antibiotics, Asiatic elephant (*Elephas maximus*), putrefy, wound

INTRODUCTION

The elephant, the largest among living terrestrial animals is classified under the family- Elephantidae and order Proboscidea which has origin from its possession of proboscis or trunk. The only two species of elephants that exist on earth today are Asiatic elephant (*Elephas maximus*) and African elephant (*Loxodonta africana*) [Bennet, 1990]. The former one is common all over the tropical south and south east Asia and are only confined to 13 Asian countries including India (Santiapillai and Jackson, 1990; Rao and Acharjyo, 2006; Hota and Sahu, 2015). The estimated population of the Asian elephants in the wild in these countries ranges between 34,000 and 54,000 (Santiapillai and Jackson, 1990; Rao and Acharjyo, 2006). India holds the largest population of wild Asiatic elephants with nearly 26,000 elephants and 3500 captive elephants found in the country (Rangarajan et al., 2010). Elephants travel long distances as part of their migration activities and they stay within different forest habitats that are enriched with water and fodder (Graham et al., 2010; Hedges et al., 2009; Palei et al., 2016). Elephant is the largest terrestrial animal having large sized compact brain, massive bones, thick skin (probos), long trunk, without gall-bladder, strong olfaction, distinct digestive system with large colon and a good walker (Prater, 2005). Over the years, human have mastered the art of captivating these animals and utilized for their own work in many ways. In different situations, wild or domestic elephants need to have inter-state movement either in search of food abundance or foraging in herd (Palei et al., 2014). Sometimes, these animals get stressed and injured during the process of rearing, travelling, bathing, eco-tourism, temple and festive activities, etc. Samantaray (2007) has emphasized on care and management of captive and wild animals in different parts of the state of Odisha including management and treatment of domestic elephants those are coming from other states in search of food and living. Some of these injuries occur

due to non-specific causes though the elephant skin is very thick i.e. 2.5-5.0 cm. (Sukklad et al., 2006). Pachyderms are commonly encountered with traumatic injuries resulting in a variety of superficial and deep wounds. In general, abscesses may occur in all parts of the body in elephants and may become chronic, if not attended in time (Ollivet-Courtois et al., 2003). The elephant's skin lacks sebaceous glands. These anatomical factors may interfere with wound healing (Sukumar, 2003) and even death of elephants in some cases (Sahoo et al., 2017). Latent period of development of abscess varied from weeks to months (Schmidt, 1986).

CASE HISTORY

The particular elephant named Champabati during a commercial ride came from Benaras to Reamal block of Deogarh district of Odisha along with 3 other elephants during August 2013. It was suffering from huge circular abscesses in both forelegs at knee joint posteriorly. As reported, the right leg incurred injury first during 2003. In due course, left leg got injured during 2004. Initially, there were little swellings in both the knees. Later, they became oedematous. During their movement from state to state, things were aggravated and the wounds became infectious. However, in some of the Veterinary Hospitals, the elephant was extended treatment during the travel. Dressing of wounds, although irregular were undertaken, pus evacuated with some parenteral injections and supportive therapies. Initially, the wounds showed little improvement. Later both were infected and enlarged. During 2007, there were significant openings in both knees with constant ooze out of bloody fluid and pus. Within next 7 years, the elephant was produced to number of Veterinary Hospitals for treatment. Many vets and para vets had attempted their best with different wound management therapies as per some document available with the mahout. Within 2003 to 2013, not much improvement was noticed. Both the wounds were reported to have further aggravated.

MATERIALS AND METHODS

The female elephant weighing about 3000 kg body weight was produced at Reamal Veterinary Dispensary of Deogarh district, Odisha, India on 28.08.2013 (Fig. 1). Reamal is situated at 21.3519°N and 84.6610° E, some 26 kms from district H.Q. town of Deogarh. Before approaching treatment, the temperature, pulse and respiration of the elephant were recorded and found to be normal.

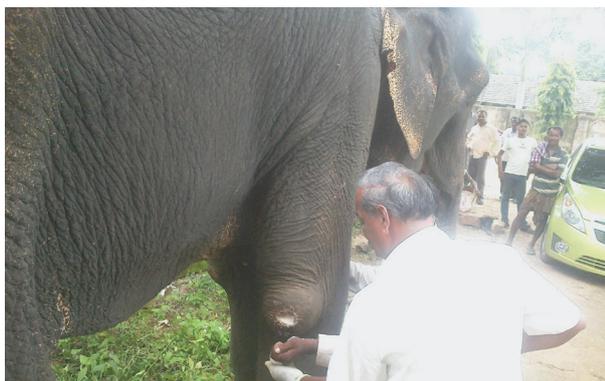


Fig. 1. The elephant produced at Reamal Block Veterinary Hospital; $MgSO_4$ incorporated into the abscess cavity as initial approach (28.08.2013)

Wound status

The size of the left wound was measured to be 10" circumference, 3" diameter having opening size of 2" diameter (Fig. 2). The size of right wound was 54" circumference, 18" diameter having opening size of 4" diameter (Fig. 3). Thick pus and bloody fluid were constantly oozing out from these chronic wounds, reported to be 10 years old.



Fig. 2. Gauze pack to retain $MgSO_4$ in the right side abscess

Strategies

In chronic wounds, surgical interventions have been taken up in different captive and wild animals (Das et al., 2014). Herein, also a definite strategy was made to accomplish the job. The veterinary officer stationed at the dispensary, an expert in Wild animals health care and management attended the case. After visualizing the wound, a long term plan was drawn. The owner was

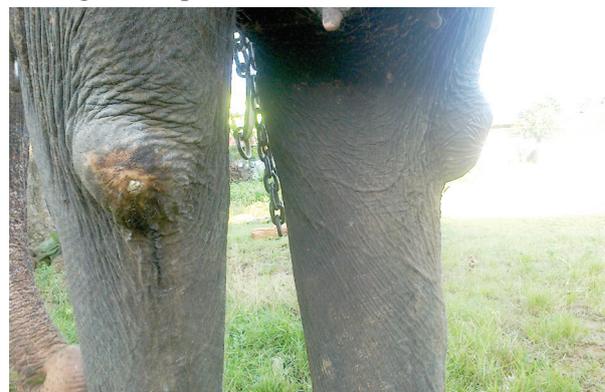


Fig. 3. Left side abscess also fibrosed having a central opening

advised to stay in and around Deogarh district of Odisha so that the expert vet could physically verify the wounds time to time and monitor the treatment regularly. A master plan was drawn in consultation with the Chief District Veterinary Officer of the district. It was decided that the owner will be advised to retain the animal in the district for minimum 1 month. All the vets were advised to extend treatment at their jurisdiction during the course of the animal movement in the district as per the guidance of the expert vet. The mahout was advised to take the elephant in the usual route and halt the animal for continuance of the treatment nearer to a dispensary as demands. The interim surgery and the wound management were taken up under the direct supervision and guidance of the wildlife vet stationed at Reamal block. Treatment was rendered as per the following protocol.

Medication

On 28.08.2013, the pus from both the cavities were flushed with lukewarm $KMnO_4$ and cleaned. Then $MgSO_4$ was introduced liberally

to putrify the hard fibrous mass and reduce the mass size for better manoeuvring (Fig.1). Fowler (1986) established that penicillin has been the drug of choice in different disease conditions and steroids have been recommended in case of traumatic injury and inflammation. Samantaray and Mishra, 2007 successfully treated a wild pigmy elephant at Satkoshia Wildlife Sanctuary Gopalan (1996) used Strepto-penicillin successfully in injured elephant in case of bullet injuries. In line with that, it was decided to go for penicillin at the first go. Dicrystacin LDV (Streptopenicillin

-1 g and Penicillin G sodium-1.5 g) 7 vials, inj. Melonex(Meloxicam) 100 ml, Prednisolone 30 ml and Hivit 30 ml were administered intra-muscularly (I/M) daily. Brotone liquid 200 ml. was given daily orally. Himax ointment applied locally with Topicure spray all around the wounds. For three days, MgSO₄ was kept to act upon the abscess. On 31.08.2013, putrefied tissues were curetted. Treatment extended from 31.08.2013 - 01.09.2013 to see the further development, shown in (Table 1). There was no significant reduction of the size of the abscess.

Table 1 Medication from 28.08.13 to 01.09.13

Sl. No.	Name of medicine and Company	Type and presentation	I/M, I/V or Oral	Quantity administered	Schedule	Dosage
1	Dicrystacin LDV (SARABHAI ZYDUS)	Antibiotic Streptopenicillin -1 g Penicillin G sodium-1.5 g	I/M (Intra-muscular)	Large Dose Vial x 6 Vials	Once Daily at morning	50 mg kg ⁻¹
2	Melonex (INTAS PHARMA)	Analgesic, anti-inflammatory Meloxicam Inj IP 5 mg ml ⁻¹	I/M	50 ml x 1 Vial	Once daily at morning	1 ml/ 60 kg b.wt.
3	Prednisolone (INTERVET)	Steroid Prednisolone Acetate (10 ml x 1 vial)	I/M	10 ml x 3 vials	Alternate day	1 ml/ 100 kg b.wt.
4	Hivit(50 ml vial)	Nerve tonic	I/M	50 ml x 1 vial	Once Daily at morning	1 ml/ 60 kg b.wt.
5	Brotone Liq (500 ml bottle) (VIRBAC)	Multivits (500 ml bottle)	Oral	500 ml x 1 bottle	Once Daily at morning	1 ml/ 100 kg b.wt.
6	Topicure (NATURAL REMEDIES)	Poly herbal Ayurvedic anti-bacterial and anti-inflammatory 250 ml. pack	Outward spray	As per need	Both morning and evening	Local spray
7	Himax ointment (INDIAN HERBS)	Anti-maggot, anti-fungal 50 g cream	Local application	As per need	Both morning and evening	Around the wound

Wound status as on 02.09.2013

From 2nd September onwards a change in medication protocol was made as follows. Since, MgSO₄ did not respond much to reduce the hard fibrous mass of the abscess, use of CuSO₄ was planned. Accordingly, on 02.09.13, CuSO₄ (75 gm) was introduced into the right wound in both the pockets proportionately and CuSO₄ (15 gm) into the left wound for 4 days (upto 05.09.13) keeping in view of fast degeneration of the hard masses (Fig. 4). Keeping view of this, dressing was suspended upto 05.09.2013 except outward cleaning of the wound. For these days, antibiotics and steroid were dropped and only meloxicam injectible and tabs in alternate days including other supportive therapies were continued.



Fig. 4. Abscess status in both fore legs posteriorly at Barkote Veterinary Hospital_ 1st time use of CuSO₄(02.09.2013)

Wound status as on 06.09.2013

On 06.09.13, the hard mass of the cavities found to be degenerated and seen in form of soft tissue bands and greenish thick fluid. A thick band of 1/2" breadth of greenish tissue half way detached from the base of the wound was noticed. It was cleaned by artery forceps. Wound was flushed with diluted KMnO₄ and applied with betadine liquid. Since some fibrous mass was still left, it was decided to reuse CuSO₄. Once again 125 g CuSO₄ (crystals) entered into 3 different cavities in both the wound pockets and allowed to be kept for next

3 days (from 06.09.13 to 08.09.13) and examined for further dressing from 09.09.2013 (Fig. 5). Medication as earlier was repeated.



Fig. 5. Examination of wounds after 2nd use of CuSO₄, at Barkote; planning a thorough dressing (08.09.2013)

Wound management from 09.09.13 to 17.09.2013

On 09.09.2013, it was noticed that greenish pus coming out of the wound, the border of the wound cavity being greenish too. There were significant tissue degeneration and necrosis from the impact of CuSO₄. The wound pockets were thoroughly washed and cleaned with 1% luke warm KMnO₄ lotion (Fig. 6). Debridement of thick band of greenish dead tissues invaded into three cavities were taken up with help of B.P. blade and artery forceps. Bleeding was controlled by betadine soaked gauze and rubbing of alum into the cavities. The wound was then cleaned with normal saline mixed with 10% povidine iodine solution as per recommendations of Das et al., 2014. Wound gap was packed with sterilized gauze soaked in glycerine and chloramphenicol powder. With the surgical intervention, 60-70% of the enlargement was reduced. Then regular dressing was advocated with proper cleaning and application of Chloromphenicol powder to both the wounds. Ceftriaxone @ 6.75 mg kg⁻¹ was administered daily intra-veinously including metrozyl @ 1 mg kg⁻¹, meloxicam @ 0.6 mg kg⁻¹ Himax ointment was applied all around the wound with Topicure spray as fly repellent (Table 2).

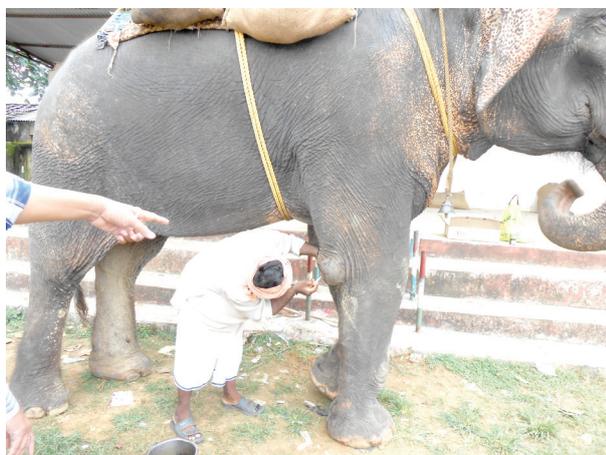


Fig. 6. Curetting of right wound after use of CuSo_4 (09-09-2013)

By this time, at left side injury there was scab in the middle and having few congestions all around the scab. Alternate dressing was advocated with local application of povidine iodine. The right side wound cavities were flushed with normal saline after cleaning the dead tissues by artery forceps. The wounds size were markedly reduced to 4" and 1" diameter in both right and left wound respectively. After cleaning with gauze cloth, povidine iodine liquid was sprayed into the cavities liberally. Himax ointment was applied all around the wound including topicure spray all over the wound. Meloxicam and vitamins were continued and hot fomentation was recommended.

By 15th, the wound size started reducing. Marked improvement of both the wounds were noticed. In the meanwhile, left abscess size was drastically reduced. Regular dressing was undertaken, pus evacuated, betadine soaked gauze introduced into the cavity as a routine protocol. Cavities of right wound were properly curetted and cleaned by artery forceps follows by normal saline (NaCl) spray into the cavities. Then the cavities were cleaned with betadine soaked gauze cloth. From 09.09.13 onwards, new generation antibiotics with combination of Ceftriaxone and Tazobactam was recommended and administered upto 17.09.13. Recommended doses of Neuroxin-M, metrozyl and fluid therapy were also added to the change in protocol which worked better (Fig. 7). It corroborates with the work undertaken by Das et al. (2014).



Fig. 7. Administration of antibiotics (Intacef Tazo), supportive and fluid therapy

Wound status as on 18.09.13

By 18th September, the left wound was healed having circular scar with tender skin cover and right side wound shown significant improvement and tendency of healing. It was then decided to continue the dressing for right side wound only upto 24.09.13. By this time the left side wound had healed with only tender skin cover. By 18th the size of the right wound was substantially reduced (5" cir./ 1.5" dia) covered with semi white tender skin formation having marked congestion. Medication including dressing was continued for the next 7 days i.e. from 18.09.13 to 24.09.13 for the right side wound. But it was preferred to drop the anti-biotics, analgesics and antihistaminics after 18th. Rest of the treatment continued upto 24th. On 19th morning wound size was reduced to 1" only. From 19th onwards chloramphenicol powder (paraxin caps of Nicholas Pharma) sprayed to the wound sites at both left and right wounds respectively 2-3 times daily maintaining all necessary aseptic procedures (Fig. 8).

Wound status from 21.09.13-23.09.2013

By this time the pachyderm had entered into Tileibani block. Right wound shown signs of significant improvement and hence from 21st only chloramphenicol powder was applied locally 2-3 times daily including supportive therapy upto 23rd. By 23.09.2013, right wound was filled up with tender skin cover (Fig. 9).

Table 2. Medication from 09.09.13 to 17.09.13

Sl. No.	Name of medicine and Company	Type and presentation	Injection/ Oral administration	Quantity administered	Schedule	Dosage
1	Ceftriaxone + Tazobactam (INTAS PHARMA)	Antibiotic Ceftriaxone- 3 g Tazobactam- 0.375 g	I/V(Intra-venous)	(3.375 g x 6)	Once Daily at morning	6.75 mg kg ⁻¹
2	Melonex (INTAS PHARMA)	Analgesic Meloxicam Inj IP 5 mg/ ml	I/V	100 ml x 1 Vial	Once Daily at morning	1 ml 30 kg ⁻¹ b.wt.
3	Prednisolone (INTERVET)	Steroid Prednisolone Acetate (10 ml x 1 vial)	I/M	10 ml x 5 vials	Alternate day	1ml 100 kg ⁻¹ b. wt.
4	Neuroxin-M Vet (ZYdUS AH)	Nerve tonic Methyl cobalamine, Cyanocobalamine and B1, B6 and B12 (30 ml vial x 1 vial)	I/M	30 ml x 2 vials	Once Daily at morning	1 ml 50 kg ⁻¹ b. wt.
5	Metrozyl (OMT PHARMA)	Check post-operative anaerobic infection Metronidazole 500 mg (100 ml x 1 bottle)	I/V infusion	100 ml x 6 vial	Once Daily at morning	1 mg kg ⁻¹
6	Intalyte (INTAS PHARMA)	Dextrose(Glucose) 20 gm+ Na + K + Ca (1L)	I/V	2 L.	Once Daily at morning	Fluid mix as per acceptance
7	Rintose (WOCKHARD Ltd.)	Dextrose 500 ml (500 ml x 1 bottle)	I/V	500 ml x 4 vials(2 lts)	Once Daily at morning	Fluid mix as per acceptance
8	DNS (INFUTECH Health Care Ltd.)	Dextrose + Normal saline solution (500 ml)	I/V	2 L.	Once Daily at morning	Fluid mix as per acceptance
9	D - 10	Dextrose 10 % (500 ml)	I/V	2 L.	Once Daily at morning	Fluid mix as per acceptance
6	D - 5 (PARENTERAL DRUGS India Ltd.)	Dextrose 5 % (500 ml)	I/V	2 L.	Once Daily at morning	Fluid mix as per acceptance
5	Brotone Liq (VIRBAC)	Multivits (500 ml bottle)	Oral	500 ml	Once Daily at morning	1 ml/ 100 kg b.wt.
6	Livol Pfs Liquid (INDIAN HERBS)	Liver Tonic (5 L pack)	Oral	500 ml	Once Daily at morning	1 ml/ 100 kg b.wt.
7	Paraxin cap (NICHOLAS PHARMA)	Antibiotic, antiseptic (Chloramphenicol) 500 mg	Local application	Powder from 5 caps	Once Daily During dressing	Liberal use over wound
8	Topicure Herbal spray (NATURAL REMEDIES)	Poly herbal Ayurvedic anti-bacterial and anti-inflammatory 250 ml. pack	Outward spray	As per need	Both morning and evening	As local spray
9	Himax ointment (INDIAN HERBS)	Anti-maggot, anti-fungal 50 g cream	Local application	As per need	Both morning and evening	All around the wound

Wound status as on 24.09.13

By 24.09.2013 the right wound had only circular swollen scar mark of 3" cir/1" dia signifying the complete healing. Further, advised to use Volini gel (diclofenac base) to the swollen part with hot fomentation twice daily for couple of week to reduce the swollen parts of both the wounds. As such by 24.09.2013, the elephant was seen to be healthy and both the wounds were completely healed up (Fig. 10).

RESULTS AND DISCUSSION

Injuries in elephants normally take long time for healing. Sometimes, there are possibility of fractures since bones are very porous in nature. That is why, in the above case, time to time expert opinion was sought considering the intake of medicine, the wastage and other miscellaneous factors like animal's physiological conditions, mood, moment, weather, human presence etc. The process of healing and the reduction of the size of the wound took long time. Hence, the owner was advised not



Fig. 8. Right wound shown significant improvement at Barkote (19.09.2013)

to leave the district at least for a month so that treatment can be rendered at different dispensaries. The owner had 3 more elephants in the group and had to change places for funds generation too to meet his livelihood. So, to give so much time to the affected animal was really difficult. Also, huge logistics and exercises were undertaken and that too correct drug dosage was also taken care of.



Fig. 9. 21.09.2013 Treatment at Tileibani block. IV Fluid with support of the platform

The abscess status as on 28.08.2013 was very bad with pus oozing out from both the cavities. When flushing was undertaken with lukewarm KMnO_4 , it seemed to be superficial since the fibrous mass did not allow the antiseptics liquid to get in. It happened to be a chronic wound of about 10 years old and had surgical intervention many a time. It seemed that because of the hard fibrous mass embedded deep into the cavities, the abscess did not respond to usual dressing and wound management. Hence, it was decided to introduce MgSO_4 liberally into the cavity to putrefy the hard mass for better cleaning and reduction of the mass size. But, it did not work with initial approach. Combination of Streptopenicillin and Penicillin G Sodium was initially approached. It did have least impact on the healing. There was no significant reduction of the size of the abscesses. Hence, it was planned to introduce CuSO_4 into both cavities to fast degenerate the fibrous hard masses to look forward a complete healing. On 06.09.13, since major fibrous masses were curetted out due to the fast impact of CuSO_4 , both the wounds were manoeuvred better.

From 9th to 17th September, combination of Ceftriaxone and Tazobactam was administered intra-veinously. Analgesics, anti-inflammatory and supportive therapy continued apart from regular dressing which started working better towards wound healing. In the process 8-10 litres of fluid were administered intra-veinously daily from 9th onwards. A wooden table was used to facilitate

giving fluid therapy to negotiate the height of the elephant. Metrozyl was administered to check further infections. Constant dressing as well as usage of vitamins like Broton liquid facilitated wound healing. Neuroxin-M supported strengthening of nerves. Meloxicam as analgesics and anti-inflammatory property put the animal calm and further reduced and smoothened the wounds. No stomachic pain and indigestion were noticed as such during the course of such a huge treatment regimen (Fig. 10).



Fig. 10. Both the wounds healed up; the elephant restored normal feeding and movement (24.09.2013)

CONCLUSION

A chronic abscess needs regular health care, dressing and necessary surgical intervention in elephants to be healed up. Although special care can heal these wounds within 4 weeks although in many cases. If abscess is very chronic and has got large fibrous mass, $MgSO_4$ will not work better; instead careful usage of $CuSO_4$ can fast degenerate the mass to fasten the wound healing. Combination of antibiotics like Streptopenicillin and Penicillin G Sodium did not work. In the present case, combination of antibiotics Ceftriaxone and Tazobactam played pivotal role in wound healing. Cleaning the wound cavities with normal saline mixed with 5% povidine iodine worked better. Chloramphenicol powder spray over both wounds got better effect on wound healing. Vitamin (Brotone liquid) and oral liver supplementation of Livol pfs liquid got better effect on overall health regaining. At the end only circular scar mark of 1" diameter observed signifying the complete healing. It took 28 days and around a month for total healing of both the abscesses.

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