Journal of Ayurveda and Integrative Medicine 7 (2016) 249–254

Contents lists available at ScienceDirect

Journal of Ayurveda and Integrative Medicine

journal homepage: http://elsevier.com/locate/jaim

Case Report

Ayurvedic management of spondyloepiphyseal dysplasia tarda, a rare hereditary disorder

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ARTICLE INFO

Article history:
Received 6 May 2016
Received in revised form
31 August 2016
Accepted 8 October 2016
Available online 25 November 2016

Keywords:
Ayurvedic management
Mustadi yapana basti
Shalishastika pinda svedana
Spondyloepiphyseal dysplasia tarda
Vata vyadhi

ABSTRACT

Spondyloepiphyseal dysplasia tarda (SEDT) is a rare genetic disease in which patient suffers from short stature, short trunk and neck with disproportionately long arms, coxa vara, skeletal features such as barrel shaped chest, kyphosis, scoliosis and early arthropathy. Only limited medical and surgical management is available in modern medicine. A 15 years old male suffering from SEDT and diagnosed as *Vata vyadhi* was treated with *Panchakarma* therapy and selected Ayurvedic oral medicines. Ayurvedic treatment was directed to ameliorate the orthopaedic clinical conditions in this case. *Panchakarma* procedures such as *Shalishastika pinda svedana* for a month and *Mustadi yapana basti* for 16 days were given along with oral Ayurvedic medicines. Same Panchakarma procedures were repeated after an interval of 2 months. A combination of Ayurvedic oral medicines such as *Trayodashanga guggulu*-500 mg twice a day, *Dashmool kvatha* (decoction of roots of 10 herbs) 40 ml twice a day, *Eranda paka* 10 g twice a day, *Shiva gutika*-500 mg twice a day and *Dashmoolarista*-20 ml (with equal water) twice a day were prescribed. Eight scales based Medical outcome study (MOS) – 36 item short form – health surveys was assessed for outcome which shows good improvement. Kyphosis, scoliosis and pain were moderately reduced. Clinical experience of this case indicates that Ayurvedic herbs along with *Panchakarma* can play a major role in the management of hereditary disorder SEDT.

1. Introduction

Spondyloepiphyseal dysplasia tarda (SEDT) is an X-linked hereditary skeletal disorder however, it may be transmitted as autosomal recessive or autosomal trait [1]. Tarda indicates the manifestation of disorder is not present at birth but appear in childhood typically between age 6 and 10 years. Prevalence of SEDT is not established but according to one study it was estimated to be at least 1.7 in 1,000,000 people without any ethnic predisposition [1,2]. The disease is due to mutations in the TRAPPC2 gene which provide the instructions for producing the protein sedlin [3]. The gene, TRAPPC2, is widely expressed in tissues throughout the body but when mutated it only affects cartilage. It is believed that Sedlin plays a role in the transport of proteins between various cell compartments. The disease mainly affected epiphyseal growth. Epiphyseal involvement is primarily in the shoulders, hips and knees. This involvement is symmetrical bilaterally. SEDT is characterized by disproportionately short stature with short trunk, barrel-shaped chest and arm span significantly greater than height. At birth, affected males are normal in length and body proportion with normal motor and cognitive milestones. Around six–eight years of age retarded linear growth appears. Progressive back pain and joints pain with osteoarthritis of mainly hip, knee and shoulder joints are prominent. Upper to lower – body segment ratio is usually about 0.8, Arm span typically exceeds height by 10–20 cm. Final adult height is typically 137–163 cm. Characteristic radiographic findings and diagnostic markers include: platyspondyly with characteristic superior and inferior humping seen on lateral view, narrow disc spaces, scoliosis, and coxa vara and evidence of osteoarthritis beginning in young adulthood. Only limited medical and surgical management is available in modern medicine. Here we represent a 15 years old patient suffering from SEDT and was successfully managed with *Panchakarma* therapy and selected Ayurvedic oral medicines. *Shalishastika pinda svedana* [sudation with medicated cooked bolus of rice] and *Mustadi yapana basti* [enema

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Peer review under responsibility of Transdisciplinary University, Bangalore.

http://dx.doi.org/10.1016/j.jaim.2016.10.002

with medicated milk] were adopted as *Panchakarma* procedures and *Trayodashanga guggulu*, *Dashmool kvatha* (decoction of roots of 10 herbs), *Eranda paka*, *Shiva gutika* and *Dashmoolarista* as selected Ayurvedic oral medicines. Signs and symptoms of SEDT at various stages are similar to be various Nanatamaj *Vata Vyadhi* (specific diseases due to only *Vata* dosha) as described in Ayurveda. Thus the patient in this case report was considered to suffer from *Vata Vyadhi* as Ayurvedic diagnosis. The clinical observations of this case is important as there is no report on Ayurveda management of SEDT.

2. Case report

A 15 yrs old Indian, male patient was consulted in Out-Patient Department of National Institute of Ayurveda, Jaipur with complaints of short stature, progressive deformity of hands, elbows and knees, lower backache, stiffness, pain in all joints, difficulty in walking and squatting and difficulty in breathing on exertion.

Patient was asymptomatic till 5 years of age then there was gradual increase of difficulty in walking. Pain and swelling in fingers (metacarpophalangeal joints) were noticed at the age of 6 years. By the age of 7 years thinning of legs were prominent. Severe walking disturbance and contracture in fingers had developed at the age of 8 years. Chest deformity was prominent till 10 years of age. Patient was repeatedly consulted in S.M.S. medical college Jaipur, Rajasthan from 5 to 7 years of age. Patient was further consulted in A.I.I.M.S. New Delhi in the year 2014, where gene mapping was done and he was diagnosed for SEDT. Patient had received non-steroidal anti-inflammatory medicines and various analgesics but his complaints did not respond to these treatments. Patient's neuromotor development was normal. Family history revealed that his cousin sister was also affected from the same manifestation. This is a rare finding however a case of a female with Turner syndrome, affecting from SEDT has been reported [4]. Patient was admitted in the *Panchakarma* ward of National Institute of Ayurveda, Jaipur on May 21, 2015 for administration of *Panchakarma* procedures.

On physical examination patient was found to be anxious with disturbed sleep, *Vishmagni* (unstable digestive functions), bowel constipated, burning micturation with reduced frequency, voice clear, roughness in skin on touch and lean body built. The patient was in *Niramavastha* [stage of disease without *Ama* (~undigested food)] with apparently normal appetite. There was no abnormal coating on tongue. Patient had *Vatapitta prakriti* with *Avara sara* (sub optimal body tissue), *Avara samhanana* (sub optimal body built), *Vishama pramana* (unequal body proportion), *Avara satmya* (sub optimal homologation), *Madhayam satva* (medium mental strength), *Avara vyayamshakti* (sub optimal capability to carry on physical activities), *Madhyam aharshakti* and *Jaranshakti* (medium food intake and digestive power). *Asthivaha srotodusti* (pathology in bone) and *Majjavaha srotodusti* (pathology in bone marrow) were more prominent. Weight was 22.1 kg, height was 128 cm, arm span was 140 cm and head circumference and distance between two eyes were normal. Higher function, mental state and speech were normal. Neurological, skin, cardiorespiratory and genitourinary system examination were normal. Audiometric results were normal. Bilateral peripheral cataract was found on slit-lamp examination of eye. The internal and external rotation of hips, the flexion and abduction of shoulders, the extension of elbows and knees were limited. Ankles and wrist were ankylosed. 5th Distal Interphalangeal joint and 2nd to 4th proximal phalangeal joints were swollen with flexion deformity [Fig. 1] Lumbar and cervical spine extensions were restricted with pain. Feet were flat and toes were abnormally long. Neck was short and thoracic kyphosis, scoliosis and barrel shaped chest were found [Fig. 2] In laboratory analysis complete blood count, lipid profile, routine urine analysis, liver and kidney functions were normal.

M.R.I. screening of whole spine and digital x-rays revealed osteopenia, flexion deformity of 5th distal Interphalangeal joints [Fig. 3], metaphyseal sclerosis of femur and tibia (knee), irregular acetabulum, coxa vara [Fig. 4], anterior beaking of vertebrae with generalized platyspondyly [Fig. 5] and disc desiccation from C3/4 to D11/12 and L4/5, L5/S1 levels.

3. Diagnostic focus and assessment

The patient had complains of short stature, contracture in hands, difficulty in walking, stiffness of spine, lower backache, osteoarthritis of hip, knee and ankle, long toe, flat fleet, barrel shaped chest, difficulty in breathing on exertion, scoliosis, kyphosis and peripheral cataract. Manifestation of SEDT at various stages is among the eighty types of *Nanatamaj vata vyadhi*. These are *Sronibheda* (deformity in hip region as like coxa Vera), *Pangulayam* (flexion deformity in fingers), *Khanjatava* (limping), *Kubjatava* (kyphosis), *Vamnatavam* (dwarfism), *Trikgraha* (stiffness

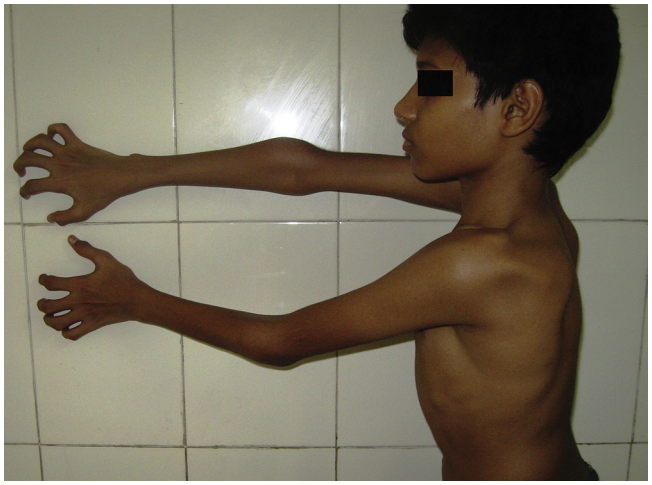

Fig. 1. Swollen proximal phalangeal joints with flexion deformity.

Fig. 2. Short neck, thoracic kyphosis, scoliosis and barrel shaped chest.

Fig. 3. Flexion deformity of distal interphalangeal joints.

Fig. 4. Irregular acetabulum and coxa vara.

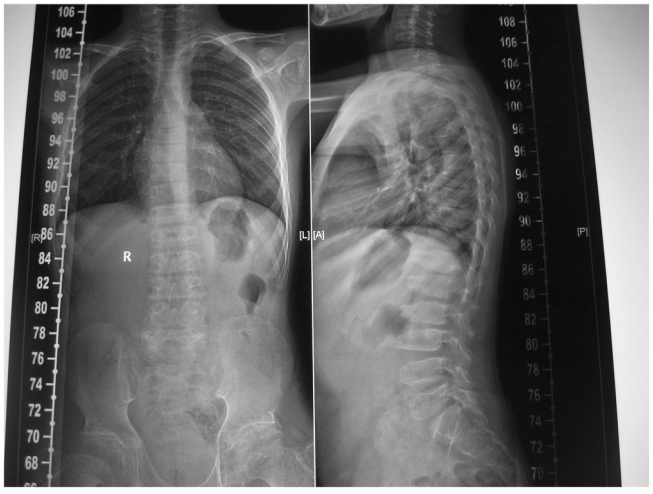

Fig. 5. Generalized platyspondyly.

of hip region), *Pristhagraha* (stiffness of back), *Pasravamarda* (pain in coastal region), *Timira* (early cataract) *Ucchaisruti* and *Badhirya* (different level of deafness), *Janubheda* and *Januvishlesha* (osteoarthritis of knee), *Vatakhudata*, *Padabhransa* (structural deformitiy in sole) *Gulfagraha* (stiffness in ankle), *Vakshauprodha* (restrictive pulmonary movement). Thus the patient suffered from a group of several *Nanatamaj vata vyadhi*. *Mukhasosha* (coarse facial appearance), *Akshivyodash* (wide set eyes), *Bhruvyodasha* (wide nose bridge), *Akshibheda* (strabismus), *Mukatvam* and *Vakasanga* (speech impairment), *Dantabheda* and *Dantasaithilya* (dentinogenesis imperfect) are the other symptoms which may be prominent in other variant of SEDT [5].Considering all these pathogenesis and manifestation, *Vata vyadhi* was considered as Ayurvedic diagnosis for the case. Anterior beaking of vertebrae with generalized platyspondyly and marked hip and knee metaphyseal lesions are characteristics of SEDT that was present in the patient. Arm span of the patient was 12 cm more than height in the case. This is described in Ayurveda as *Visham pramana*, also a characteristic of *Vata vyadhi*. Spondyloepiphyseal dysplasia congenital (SEDC), Morquio syndrome, multiple epiphyseal dysplasia (MED) and *Vatarakta* are the differential diagnosis for the case. SEDC is an autosomal dominant disorder which equally affects males and females. This disorder is often detectable at birth. Morquio syndrome is usually detectable at 18 months of age. Excretion of excessive mucopolysacharides in the urine is characteristic of Moriquio disease. MED is usually dominantly inherited and equally affects males and females. As these symptoms were first noted at the age of 5 years so this was considered a case of SEDT and from Ayurvedic point of view *Vata vyadhi* was considered as Ayurvedic diagnosis. The differential Ayurvedic diagnosis for the case was *Vatarakta* (various diseases of rheumatic spectrum). There was no *Rakta Dusti* (vitiation of blood) and also *Purvaroopa* (prodromal symptoms) of *Vatarakta* were not observed hence diagnosis of *Vatarakta* was ruled out.

4. Management

Patient was suffering from SEDT. *Vata vyadhi* was considered as Ayurvedic diagnosis. Considering the chronic nature of disease, the Ayurvedic management was directed to ameliorate the various symptoms and complications of disease. The general management of *Vata vyadhi* as *Snehana* (oleation), *Svedana* (sudation), *Mridu virechana* (mild purgation) and *Basti* (medicated enema) was applied in this case [6]. *Basti* is indicated as best treatment for any *Nanatamaj vata vyadhi* [7]. All of these principles were adopted in the management of the patient.

For the first 3 days *Mridu virechan* was administered with castor oil in the dose of 20 ml with milk. From 4th day *Shalishastika pinda svedana* for a month along with *M. yapana basti* for 16 days were administered [Table 1]. *Abhyanga* (massage) with *Asvagandha taila* (oil) was the integral part of the *Shalishastika pinda svedana*. These procedures were repeated after an interval of 2 months. Oral Ayurvedic medicines such as *Trayodashanga guggulu*-500 mg twice a day, *Dashmool kvatha* (decoction of roots of 10 herbs) 40 ml twice a day, *Eranda paka* 10 g twice a day, *Shiva gutika* -500 mg twice a day and *Dashmoolarista*-20 ml with equal water twice a day were also prescribed along with *Panchakarma* procedures during this period [Table 2]. Clinical outcome was assessed at completion of first round of *Panchakarma* procedures and at the end of second round of *Panchakarma* procedures.

5. Timeline

A detail of the case study and follow up is given in [Table 3].

Table 1
Panchakarma procedures given to a case of SEDT.

Panchakarma procedures	Method of preparation	Method of application	Days of treatment
Shalishastika pinda svedana	300 g of *Shashtika shali* (specific variety of rice, which is yielded after 60 days) is cooked with 1.5 L of milk and decoction of *Bala moola* (root of Sida retusa L.). This mixture is to be kept in four pieces of cloth to make 4 boluses. Another portion of milk and decoction of the same quantity should be mixed and heated in low temperature to dip the above boluses for warming the *Pottali* (boluses)	Massage with *Asvagandha taila* (oil) was done on whole body for 15 min followed by whole body massage for 45 min with the help of a cotton bag filled with bolus of processed rice.	30 days in each setting (From 25/05/2015-to 23/06/2015 and from 23/08/2015-to 23/09/2015)
Mustadi yapana basti	*Saindhava* salt 5 g, honey 25 g, *Ashwagandha oil* 50 ml, *Panchatikta ghrita* 25 ml, milk processed with *Mustadi yapana basti kwatha* (decoction)[a] medicines 300 ml and *Majja* (goat femur bone marrow) 50 ml are the integral part of *Mustadi yapana basti*. Powdered rock-salt is added to honey and stirred. Then oil and *Ghrita* are added to this mixture and again stirred. Then paste of *Satahva* (*Anethum sowa* Kurz) followed by decoction is to be added and mixed properly. 50 ml soup of goat femur bone marrow is added in this emulsion and then mixed properly to make homogenous emulsion. This emulsion is heated gently in a water bath.	Given before meal with *basti yantra*.	Total 16 basti was given daily. (From 25/05/2015-to 09/06/2015 and from 23/08/2015-to 07/09/2015)

[a] *Musta* (*Cyperus rotundus* L.), *Ushir* (*Vetiveria zizanioides* (L.) Nash), *Bala* (*Sida retusa* L.), *Aragwadha* (*Cassia fistula* L.), *Rasna* (*Pluchea lanceolata* Oliver & Hiren), *Manjistha* (*Rubia cordifolia* L.), *Kutaki* (*Picrorhiza kurroa*), *Trayamana* (*Gentianna kurroo* Royle), *Punarnava* (*Boerhavia diffusa* L.), *Bibhitaka* (*Terminalia bellerica* Roxb) *Guduchi* (*Tinospora cordifolia* (Wild.) Hook. F.& Thoms.), *Sthiradi Panchmoola* (roots of 05 herbs) and *Madanaphala* (*Randia spinosa* Poir) are the drugs used for decoction of *Mustadi yapana basti.*

Table 2
Ayurvedic treatment given to a case of SEDT.

Name of the drug used orally	Dose	Anupana	Days of treatment	Starting date
Triyodashanga Guggulu	500 mg twice a day	Luke warm water	From 1st day to till date	25/05/2015
Eranda paka	10 gm twice a day	milk	From 1st day to till date	25/05/2015
Shiva gutika	500 mg twice a day	milk	From 1st day to till date	25/05/2015
Dashmoolarista	20 ml twice a day	with equal water	From 1st day to till date	25/05/2015

6. Outcome measures and follow up

Good relief was noted by the patient [Table 4]. Walking and lung capacity improved after a month of treatment. Kyphosis, scoliosis and pain were significantly reduced. Weight of patient was increased by 1.9 kg. This was due to *Brihmana* (nourishing) and *Srotosodhana* (purification of channel) effect of therapy. Eight scales based on medical outcome study (MOS)-36 item short form-health surveys were assessed for outcome which shows improvement [8]. No concurrent allopathic medication was administered during this period. Patient was discharged on 8th Oct 2015 with instruction to continue same Ayurvedic medicines for longer duration and repetition of *Panchakarma* procedures after 2 months. Outcome measure was assessed on baseline, after completion of first *Panchakarma* schedule and at the completion of second *Panchakarma* schedule.

Table 3
Timeline.

Year	Events
2005	- Onset of problem in walking, was consulted in J.K.Loan hospital Jaipur, Rajasthan
2006	- Starting of contracture in fingers, was consulted in S.M.S. medical college, Jaipur, Rajasthan.
2007	- Thinning of leg were prominent.
2008	- Severe walking disturbance and contracture in fingers were developed.
2010	- Chest was deformed.
2014	- Was further consulted in a reputed tertiary care hospital and was diagnosed for SEDT. Gene mapping was done. M.R.I. screening of whole spine that was conducted on May 21, 2014 and digital X-rays revealed osteopenia, flexion deformity of 2–4th distal phalangeal joint and 5th distal Interphalangeal joints, metaphyseal sclerosis of femur and tibia (knee), irregular acetabulum, coxa vara, anterior beaking of vertebrae with generalized platyspondyly and disc desiccation from C3/4 to D11/12 and L4/5, L5/S1 levels.
21/05/2015	- Patient was admitted in O.P.D. of National Institute of Ayurveda for progressive skeleton deformity. Clinical assessment for disease based on Medical outcome study (MOS)-36 item short form-health survey was done. [Table 4]
22/05/2015–24/05/2015	- Castor oil was given at night for mild purgation.
25/05/2015–23/06/2015	- *Shalishastika pinda svedan* for one month along with *Mustadi yapana basti* for 16 days were adopted as Panchakarma procedures. Ayurvedic oral medicines such as *Trayodashanga guggulu*-500 mg twice in a day, *Dashmool kvatha* (decoction of roots of 10 herbs) 40 ml twice a day, *Eranda paka* 10 gm twice a day, *Shiva gutika*-500 mg twice a day and *Dashmoolarista*-20 ml with equal water twice a day were also prescribed along with these procedures. Ayurvedic oral medication is continued to till date.
01/07/2015	- Patient was discharged and assessment for clinical improvement was done. [Table 4]
21/08/2015	- Patient was readmitted in O.P.D. for further *Panchakarma* procedures.
23/08/2015–23/09/2015	- Same *Panchakarma* procedures and oral medication were repeated for same duration.
08/10/2015	- Patient was discharged and assessment for clinical improvement was done. [Table 4]

Table 4
Scoring based on Medical outcome study (MOS).

Scales	Scores[a] on 21 May 2015	Scores[a] on 1 July 2015	Scores[a] on 8 Nov 2015
1. Physical functioning	5.55	61.11	77.77
2. Role limitation due to physical health	100	00	00
3. Role limitation due to emotional problem	33.33	66.67	66.67
4. Energy/fatigue	5	40	65
5. Emotional wellbeing	16	52	72
6. Social functioning	12.5	50	75
7. Pain	20	65	87.5
8. General health	5	30	60

[a] Scoring by the instrument-RAND 36-item Health Survey 1.0.

7. Discussion

SEDT is a rare hereditary disorder due to abnormal synthesis of sedlin protein. This abnormal synthesis leads to manifestation of disease. Any abnormal synthesis may be due to *Vikrita Vata* (vitiated *Vata*). Vitiated *vata* can also lead to hereditary disorders [9]. *Vata* is vitiated due to several etiological factors, *Margavarana* (obstruction in natural course of vata such as normal distribution, synthesis of tissues elements etc.) and *Dhatukshaya* (~depletion of body tissue). The vitiated vata also leads to *Margavarana* and *Dhatukshaya* in vicious cycle and lead to manifestation of SEDT. The patient was treated on the line of management of *Vata vyadhi*. *Yapana Basti*, *Rasayana*, *Shilajatu* and *Guggulu* are indicated for *N. vata*, *Avrita vata* and chronic *Vata vyadhi* [10]. As patient was in the adolescent age *mridu basti* in the form of *Yapana basti* and *mridu snehana* and *svedana* in the form of *Shalishatika pinda svedana* were prescribed. *Basti* can break pathogenesis of *Vata vyadhi* by removing *Margavarodha* by purification of channels and *Dhatukshaya* by its *Brihmana* (~nourishing) property. *M. yapana basti* is indicated for increasing vigour, strength and semen. It is useful in *Katishoola* (backache), pain in thigh and calf region, abdominal pain, headache, cough and *Vatarakta* (various diseases of rheumatic spectrum). It also has *Rasayana* property. Most of *Majja* and *Asthi pradoshaj vikar* (disorders of bone and bone marrow) can be managed with *M. yapana basti* [11]. Slight modification was done in *M. yapana basti* for this case [12,13]. *Trayodashanga guggulu* is useful in *Snayugatavata* (~various tendon and ligament disorders), *Asthigatavata* (disorders of bone), *Majjagatavata* (disorders of bone-marrow), *Khanjavata* (limping disorders), and various *Vatic* disorders (~neurological, rheumatic and musculoskeletal diseases) [14]. *Dashamula kvatha* is having *Tridoshaghana* property [15]. *Shiva gutika* is a *Rasayana* and helpful in *Vatarakta*, *Shiroroga*, *Mukharoga*, *Swas roga* (dyspnoea), *Netraroga* etc. [16] *Eranda paka* is indicated in *Vata vyadhi*, *pakshavadha* (paralysis), *Amavata*, *Kativata*, *Pangulya*, *Shoola* (abdominal colic), *Vibandha* (constipation), *Kasa* (cough) etc. [17] *Dashmoolarista* is effective in *Vata vyadhi*, *Mutrakricha* (various urological disorders), *Mandagni* (diminished digestive power), *Dhatukshinata* (depletion of body tissue) etc. [18] Thus these combinations are useful to manage the manifestation of disease in this case.

The case study shows that such a hereditary musculoskeletal disease can be managed with Ayurvedic treatment. In the present case report, patient started Ayurveda treatment in the advanced stage of disease. Considering the nature of SEDT, quality of life of the patient can be improved and complication of disease can be reduced with Ayurvedic management. It may be possible to limit the manifestation of disease if the patient approaches in early stages of disease.

8. Conclusion

Ayurvedic management including oral Ayurvedic medicines and *Shalishastika pinda Svedana* and *M. yapana basti* was helpful in treating the patient of SEDT. The observations and experiences of Ayurveda management of SEDT may be useful for its treatment and research.

Patient consent

Written permission for publication of this case study had been obtained from the patient.

Funding source

Nil.

Conflict of interest

Nil.

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