Int J Ayu Pharm Chem
ISSN 2350-0204
www.ijapc.com

REVIEW ARTICLE

Lifestyle and Therapeutic Review of *Parikartika* (Fissure in ano)

Author: Satyam Supare[1]

Co Authors: Nayan Supare[2]

[1]Shalya Tantra, Dr. Rajendra Gode Ayurved college and Hospital, Amravati, MS, India
[2]Department of Kayachikitsa, Bhausaheb Mulak Ayurvedic Mahavidyalay, Nandanvan, Nagpur, MS, India

ABSTRACT

Agnimandya is brought on by lifestyle choices such sedentary behaviour, elevated stress levels, and irregular eating and sleeping schedules, which is the root cause of anorectal diseases, the most popular of which is Parikartika. Disease having kartanvat vedana (cutting pain) over anal region is called as parikartika, with signs and symptoms that are similar to fissure in ano in modern texts. Parikartika is mentioned in Ayurvedic texts as a complication of many Ayurvedic procedures such as vaman, virechana, and basti, as well as a complication of some disorders such as Arsh, Atisar, and Grahani. An individual's health is affected by his nutrition, environment, and way of life. Analgesic, stool softener, and soothing ointment are used to treat acute fissure-in-ano. Anal dilatation, sphincterotomy, fissurectomy, and anal advancement flap are used to treat chronic fissures are hazy, but the side effects of these operations, including as recurrence, incontinence, and pruritus, are even more painful than the illness itself. Principles of management of parikartika in Ayurveda are more focused on stabilizing the digestive functions and improving the nature, character and consistency of stool in addition to the use of laxatives and wound healing (vranaropaka) agents.

Key Words *Parikartika, fissure in ano, Treatment*

Received 18th February 2026 Accepted 02nd May 2026 Published 10th May 2026

INTRODUCTION

Ayurvedic literatures explain the aetiology, symptoms, classification and the treatment of various diseases which are prevalent in the mankind even to this day. These diseases are yet again explained under the heading of Ashtangas of Ayurveda i.e., Kaya, Bala, Graha, Urdhwanga, Shalya, Damshtra, Jara, Vrisha chikitsa. So, the treatment modalities of these diseases vary accordingly. Vedas, one of the ancient scriptures of Hinduism mention about various clinical disorders which prevailed during the Vedic period. Various aspects of health and disease during that period have been described, but some other diseases which we come across in the present era are not found in the Vedic scriptures. This may be regarded as an outcome of change in the lifestyle of the people after the Vedic period. Parikartika, which is seen as a severe painful condition in the anal region has no direct references in the Vedic scriptures. But Arshas which is another ano-rectal condition is

REVIEW ARTICLE

mentioned in the Vedas. In Ayurvedic texts, Parikartika is explained as an associated symptom of Arshas. So, it is difficult to assume whether they had the knowledge of such a painful condition i.e., Parikartika but failed to mention it under a different heading is quite debatable.

Various life style disorders are on the rise in this period as a result of shifting lifestyles such as sedentary behavior, increased stress, and poor dietary and sleep patterns. This causes Agnimandya, which is the root cause of anorectal diseases[1], the most popular of which is Parikartika.

The classics include a detailed explanation of parikartika and its treatment. All Bruhatrayi and later writers of Ayurveda have provided references on Parikartika. This disease is found in the gudapradesh (anal region), the seat of sadyapranahar marma[2] and it necessitates careful treatment. Parikartika is a very common ailment and it manifests as individual disease or as Vamana–Virecana Vypada, Basti Karma vypada and also found as Upadrava of Atisara, Grahani, Arsa, and Udavart[3]. Acharya Sushruta explained the pathogenesis of disease as follows: If an individual is debilitated, with Mrudukoshta (mild digestive power), Mandagni (poor appetite), more food with the qualities of Ruksha (dry), Ushana (hot), Lavana (salty), etc. is consumed, Pitta and Vata become vitiated[4], and disease having kartanvat vedana (cutting pain) over anal region is called as parikartika, with signs and symptoms that are similar to fissure in ano in modern texts.

A fissure in ano is a tear in the anoderm distal to the dentate line[5]. An anal fissure is a longitudinal break in the distal anal canal's anoderm that runs from the anal verge proximally to the dentate line, but not beyond it.

Synonym: - Fissure in Ano, Anal fissure.

The pathophysiology of anal fissure is assumed to be linked to trauma caused by hard stool passage or persistent diarrhoea. The internal anal sphincter spasms as a result of a tear in the anoderm, resulting in pain, greater tearing, and decreased blood flow to the anoderm. This cycle of pain, spasm, and ischemia contributes to the development of a wound that does not heal properly and develops into a chronic fissure. Majority of anal fissure occurs in the posterior midline (90%) and much less common anteriorly (10%)[6].

Fissure is classified as Acute & Chronic on the basis of chronicity. In Acute fissure in ano there is severe sphincter spasm without oedema and inflammation. A deep canoe-shaped ulcer with thick oedematous edges is a chronic fissure in ano. A hypertrophied papilla found at the ulcer's upper end. A skin tag called as "sentinel pile" is present at the bottom end of the ulcer, and an internal sphincter spasm is always present[7].

Fissure treatment in Ano is determined by the type of condition. Analgesic, stool softener, and soothing ointment are used to treat acute fissure-in-ano. Anal dilatation, sphincterotomy, fissurectomy, and anal advancement flap are used to treat chronic fissures. [8] are hazy, but the side effects of these operations, including as

REVIEW ARTICLE

recurrence, incontinence, and pruritus, are even more painful than the illness itself.

In Ayurveda the treatment modalities for Parikartika are internal medications and local applications. Description available in classics regarding surgical management of Parikartika local therapies like Anuvasana Basti, Picha Basti, Tail poorana, Lepa, pichu dharana are more effective than internal medications. Various topical wound healing therapies, especially for fissure-in-ano, are now available on the market for local treatment.

ETIOPATHOGENESIS OF PARIKARTIKA

As mentioned above, parikartika is not described as an independent disease entity in Ayurveda; rather, it has been presented as a symptom found in other diseases or as a complication of some procedures. The various etiological conditions described in Ayurveda for parikartika can be described under the following subheadings. Parikartika as an associated symptom in other diseases-

- Jwara – In cases of long-standing fever (jeerna jwara), faeces become hard due to decreased appetite and dehydration and may cause a crack or tear in anal region while passage of stool[9].
- Vataja Grahani – Parikartika has been enumerated as a symptom of vataja grahani. While describing the etiology, Charaka has mentioned the excessive intake of bitter, pungent and astringent (katu-tikta-kashaya) foods or the food items which are too dry (atirooksha) or cold (atisheeta) or fasting and to suppress the urge of defecation. All these factors contribute to make the faeces dry and hard which may cause fissure in ano while defecation[10].
- Vataja Pakwatisara – In later stages of vataja atisara, when the tonicity of anal musculature increases (i.e., there is a spasm) and there is frequent passage of very little but hard and frothy faeces with pain, guda parikartika occurs[11].
- Pureeshavrodhajanya Udavarta – Due to suppression of urge of defaecation, faeces are pushed back into the colon wherein, due to further absorption of water, faeces become dry and hard which then causes anal fissure during defecation[12].
- Kaphaja Arsha – The symptoms of kaphaja arsha includes the frequent passage of stool mixed with mucus and tenesmus i.e., the suggestive features of colitis which lead to development of anal fissure due to repeated trauma to anal canal[13].
- Prodromal symptom of Arsha – The causative factors described for arsha mostly includes the dietary factors which lead to derangements in the digestive functions and hence lead to features of dyspepsia, flatulence and alteration of bowel habits i.e., either constipation or colitis like features, both of which predispose to the development of anal fissure[14].
- Malavritta Vata – It demonstrate the stage of chronic constipation due to slow transit or low motility functions causing abdominal distention,

REVIEW ARTICLE

pelvic pain and passage of dry and hard faeces leading to fissure in ano[15].

- Vyanavritta Apana Vayu – Here also, due to reverse peristaltic movements or disrupted motility functions of colon and rectum, parikartika occurs in addition to distention and vomiting[16].

Parikartika as a Complication of Panchkarma procedures-

- Complication of Excessive Virechana (purgative therapy) – Both Charaka and Sushruta has against the excessive use of purgation or strong purgation in a weak and emaciated person as it may lead to the development of fissure in ano[17-18].
- Complication of Excessive use of Vasti (medicated enema therapy) – Charaka has also enumerated fissure in ano as a complication due to excessive use of vasti therapy[19].

Clinical Features and Diagnosis of Fissure in Ano-

The principal symptoms in adults are anal pain, bright red bleeding, perianal swelling and occasionally mucous discharge. The intense, excruciating pain that typically lasts for an hour or longer begins during defecation. A dull ache is usually experienced for 3-4 hours after defecation. It may stop abruptly, and the sufferer will be comfortable until the next bowel activity. Remissions can last a few days or weeks. Instead of going through the agony of defecation, the patient tends to get constipated. There is a small amount bleeding, and it is a vivid red colour. It is uncommon to lose a lot of blood. Swelling and discharge are characteristic of chronic fissure, which may be complicated by pruritis ani and perianal excoriation. Discharge may indicate an intersphincteric abscess or a fissure-fistula.

Inflammation causes a sentinel tag on the distal aspect of chronic fissures[20].It has inflamed indurated edges, as well as a base made up of scar tissue or the lower border of the internal sphincter muscle. The ulcer is canoe-shaped, and there is a tag of skin on the inferior extremity that is generally oedematous. Because it protects the fissure, this tag is referred to as a sentinel pile. There may be spasms of the internal sphincter's involuntary musculature. This muscle becomes organically constricted by infiltration of fibrous tissue in long-term situations. Infection is prevalent and can be severe, leading to the formation of an abscess.A cutaneous fistula may follow.

- Examination

In most patients it is possible to make a diagnosis of anal fissure by inspection alone. The patient is usually anxious and may be in pain also patients are naturally fearful of having a rectal examination and the perianal skin is usually puckered by spasm of the internal and external anal sphincters and tightly held buttocks.

- Inspection

Despite excessive sphincter activity, it is usually possible to notice a skin tag along with a small amount of blood or discharge on the perineum. Gentle traction on the lateral margins of the perineum nearly always reveals a fissure present below the dentate line. Sometimes perianal

REVIEW ARTICLE

dermatitis (fungal dermatitis) also presents near anal verge which causes itching to the patient. In this condition it is necessary to treat dermatitis along with fissure.

- Palpation

This is performed only after inspection to go through any associate pathology in anal canal. Digital rectal examination (DRE) is to be done by introducing properly lubricated index finger and thumb remains outside to palpate pathology around anal verge. Intense spasm of the sphincters and an irregular, painful depression near the anal margin are usually prominent features of acute fissure. In chronic fissure a fissure bed with indurated edges is present which sometime associates with hypertrophied anal papilla. Subcutaneous abscess, submucosal abscess and intersphincteric abscess associated with chronic fissure are also noticed sometimes by digital rectal examination.

- Proctoscopy

It is usually not done in case of fissure in ano, if hemorrhoid or other pathology present it can be done in local anesthesia.

- Sigmoidoscopy

This is necessary in case of secondary fissure to identify the primary pathology. It is done under general anesthesia to diagnose distal proctitis, colitis, Crohn's disease, tuberculosis, adenomatous polyps which can cause secondary fissure.

Ayurvedic view of Parikartika Chikitsa-

Parikartika is treated as a complication of Sansodhana chikitsa and certain diseases. Kashyap mentioned its management according to doshik involvement of Parikartika. None of Samhitas described about surgical management, so it indicates that conservative treatment is sufficient for the treatment of Parikartika.

In general, the goal of treatment is to achieve Samprapti Vighatana, or to lessen the power of the Vyadhi Ghatakas, i.e.

1.In general, the goal of treatment is to lessen the strength of the Vyadhi Ghatakas, or Samprapti Vighatana. The vitiation of Vayu (Apana Vayu) caused by Purisavega Avaroadha results in Vibandha and Parikartika. So, the cycle needs to be broken.

2. In Parikartika, Arsha, Atisara, and Grahani, the Mandagni is the most essential component. So, increasing and maintaining the Agni in a balanced state is required.

In the treatment of Parikartika, Acharya Charaka placed a specific emphasis on Ama[21]

1. Sama Dosha - a) Langhana b) Pachana c) Rooksha Ushna Laghu Bhojan.

2. Amajirna - Anubandheshu (Vrddha Vagbhata's Nirama condition) - usage of Kshara, Amla, Madhu, and Acharya Charaka also mentions Brimhana and Madhura Drava in malnourished patients.

3. In the case of a Vata predominance, the patient should take the following drug[22].

- Sarpi that has been treated with Dadima Rasa and Pushpa Kasis, Kshara, or Lavana.
- Food and drink made of sour curd, Dadima (pomegranate) skin
- Devadaru and Tila paste, with warm water.

REVIEW ARTICLE

➢ Asvattha, Udumbara, Plaksa, and Kadamba were added to boiling milk.

Diet-[23]

In Saama condition, Langhana- Deepana and Ruksha –Ushna - Laghu diet

1. Madhura and Brihaniya diet, advised in thin & lean patient.

2. In severe Vata Prakopa Avastha, Ghrit with Daadimarasa should be given.

3. Devdaaru and Tila Kalka with Ushnodaka

4. Ashvattha, Udumbaar, Plaksha and Kadamba Siddha milk.

Local Treatment-

The main aim of treatment is to relive sphincter spasm and healing of fissure wound, soothing of anal canal and to alleviate the excruciating pain, as well as the accompanying bleeding burning and sensation.

1) Matra basti (type of Anuvasana basti): It acts as a retention enema and it helps in easy voiding of stools, by this Vatanulomana occurs and it cures the diseases caused by aggravated Vata as Parikartika is Vata dominate Vyadhi. Spasms are alleviated and discomfort is reduced when Matrabasti local Snehana is administered. It softens stools, lubricates the anal canal, and makes evacuation easier[24].

2)Tailapoorana: In this Procedure Per rectal administration of 15-20 ml oil (having Vranaropana property) will reduce the spasm of the sphincter muscles by that pain reduces and ulcer heals[24].

3) Taila/Grita pichu: It forms protective layer over fissure wound, its sooths the anal canal so relieves pain by releasing sphincter tone and it cleans the wound thus helps in healing of ulcer[25].

4) Avgaha sweda (hot fomentation-sitz bath): Sitting in the warm/hot water tub after each bowel movement soothes pain and relaxes spasm of internal sphincter for some time. It also helps in cleaning of fissure wound. Sitz bath is highly effective in treatment of fissure. It is done for10 to 15 minutes[25].

5)Kshara Sutra Therapy: Ligation of Kshara sutra to sentinel pile masses, by this themselves they may fall within few days.

6)Kshara Lepa: Lepa of Apamarga Pratisaraneeya kshara is done over the (Chronic fissure-in-ano) ulcer surface, by scraping action of Kshara, this reduces the excess fibrous tissue present over the ulcer surface and ulcer heals & sphincter relaxation occurs simultaneously.

7)Agnikarma: Para surgical procedure like Agnikarma has been widely advised by Sushruta & by doing Agnikarma treatment has provided marked relief with no recurrence. Excision of sentinel piles by Agnikarma by electro thermal cautery can be done.

8) High fibre diet: The rate at which food passes through the intestine is determined by the composition of the diet and its fluidity. patients should eat a high-fiber diet and drink enough of water on a daily basis to enhance digestion and bowel regularity. These are hygroscopic, which allows them to expand and become mucilaginous. These fibers are a type of complex carbohydrate that binds to water in the colon to produce bigger, softer stools. Stools that are larger and softer

stretch and relax the sphincter muscles, allowing blood to flow more freely and requiring less pressure to pass.

Treatment for Chronic Fissure-In-Ano-

Giving anal dilators to patients is frequently associated with minimal compliance and, as a result, little efficacy. Topical use of pharmacological medications that relax the internal sphincter is the mainstay of contemporary conservative therapy, most commonly:

- Pain is reduced by nitric oxide donors (Scholefield), and improved vascular perfusion promotes recovery. Glyceryl trinitrate (GTN) 0.2 percent administered to the anal margin two to three times per day (although this may produce headaches) and diltiazem 2 percent applied twice daily.

Operative measures[26] -

1. Lateral internal sphincterotomy.
(a) Open method
(b) Closed method
2. Lord's dilation (blunt sphincterotomy).
3. Fissurectomy and local advancement flap.

DISCUSSION

According to Ayurveda, there is no defined illness entity for anal fissure. Parikartika is a phrase used in the Samhita to denote the reality that Gudaparikartika can be linked to Fissure-in-ano based on its location, pathology, and features. The detail description about Nidana (etiology), Samprapti (pathogenesis), Laxana (symptoms) & Chikitsa (treatment) is mentioned in Sushruta samhita, Kashyapa samhita, Astanga Hridaya etc. There is detail description about conservative and surgical treatment for Fissure-in ano.

As an Ayurvedic physician, it is our responsibility to learn about the disease. The mental image of the disease should be consistent and clear with Ayurvedic principles. It should go through six stages of Kriyakala as a sickness. The 5th stage shows the creation of noticeable anal fissures (Vyakta Avasta). It must go a great distance from Nidana to Vyakta Avasta as a manifestation of sickness. There are two main symptoms associated with Pakwasaya Avruta Vata: dry hard stool and Parikartika. It was mentioned in another context as a symptom of Vyana Avruta Apana, which was linked to Adhmana and Udavarta. Slow-transit constipation may be caused by this phenomenon. Because of Nidana Sevana, there was Prakopita of Dosas, which led to Sthansamsraya in Samvarani Gudavali. Though the condition was caused by hard stool, we believe that the foundation for disease formation is laid out early, due to micro damage caused by abrasive food, which could be the source of persistently raised internal anal sphincter tone. In Sthansamsraya, these steps were finished. Though it is simple to understand, it is caused by Abhighat, which is direct trauma caused by hard stool, resulting in Ksataja Vrana or Guda Vidarana and eventually Dusta Vrana.

The general principle of treatment is to treat the disease while eradicating the source. The Agni should be maintained, and the correct atmosphere for healing should be provided. The traditional treatment is usually sufficient, and surgical intervention is rarely required. A Guda - Parikartika is a disease in and of itself, with multiple stages and Dosa participation; when it is coupled with other diseases, it follows the same criteria.

CONCLUSION

Though not mentioned as an independent disease entity in Ayurveda, an elaborative description of guda parikartika is available in various contexts in different texts of Ayurveda which is in much agreement with the etiology and symptomatology of fissure in ano described in modern surgery. The clinical features of a painful tear in the anal canal with bleeding and burning sensation caused by dietary factors, anal trauma due to hard stool or other causes and the conditions with increased frequency of defecation like diarrhoea and colitis, along with the description of fissure in ano during pregnancy is available in both, Ayurveda and the modern surgical texts. The principles of management, however, follow a slightly different approach with modern surgery focusing more on to relieve the muscular hypertonia of anal sphincters by pharmacological as well as surgical means, Ayurveda being more focused on stabilizing the digestive functions and improving the nature, character and the consistency of the stool with no surgical approach being defined for guda parikartika. Use of laxatives and wound healing agents is however a common approach followed in both the systems. before prescribing the drastic purgatives for Sanshodhan chikitsa or during the treatment of Parikartika, the condition of sama-nirama, kostha, body constitutions and secondary causes of parikartika should be examined properly.

REVIEW ARTICLE

REFERENCES

1. Dr.Brahmanand Tripathi , Astanghridayam of Shreemad Vagbhata, Edited with "*Nirmala*" Hindi commentary , Reprinted 2019, Nidansthan, adhyay 12/1 Page no -512.

2. Dr.Anant Ram Sharma, Sushrut Samhita vol.11 Shareersthan Chaukhamba Subharti Prakashan, Varanasi, edition 2017, adhyay 6/18, page no.89.

3. Yadavaji T.A. Sushrut Samhita.Vol II. 2002. Chikitsa sthan. Chaukhamba orientalia: Varanasi. pp.207-8

4. Sharma P.V. Sushruta Samhita. Vol II. 2005. Chikitsa Sthana. 34/16.Chaukhambha ishwabharti Publishers: Varanasi. p.595.

5. SCHWARDs Brunacardi F.C. Vol. II. 9th ed. P no. 1059.

6. Das S. A concise Text book of Surgery. 9thed. Kolkata: Somen Das Publisher; 2016. p 1083.

7. Das S. A concise Text book of Surgery. 9th ed. Kolkata: Somen Das Publisher; 2016. p1083.

8. Das S. A concise Text book of Surgery. 8thed. Kolkata: Somen Das Publisher; 2015. p 1086.

9. Acharya YT, editor. 2008. Ayurveda Dipika Sanskrit commentary of Chakrapani on Charaka Samhita Chikitsa Sthana: Chapter Verse 186. Reprint ed. Varanasi:
Chowkhambha Surbharati Prakashana.

10. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Chikitsa Sthana: Chapter 15, Verse 59-63. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 462.

11. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Chikitsa Sthana: Chapter 19, Verse 5. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 558.

12. Shastri AD, editor. 2008. Ayurveda Tattva Sandipika Hindi commentary on Sushruta Samhita Uttara Tantra: Chapter 55 Verse Varanasi: Chaukhamba Sanskrit Sansthan; 405.

13. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Chikitsa Sthana: Chapter 14, Verse 17. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 422.

14. Shastri AD, editor. 2009. Ayurveda Tattva Sandipika Hindi commentary on Sushruta Samhita Nidana Sthana: Chapter 2 verse 9. Varanasi: Chaukhamba Sanskrit Sansthan; 307.

15. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Chikitsa Sthana: Chapter 28, Verse 70-72. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 760.

16. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Chikitsa Sthana: Chapter 28, Verse 211. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 812.

17. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Siddhi Sthana: Chapter 6, Verse 61-67. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 1028.

18. Shastri AD, editor. 2009. Ayurveda Tattva Sandipika Hindi commentary on Sushruta Samhita Chikitsa Sthana: Chapter 34 verse 16. Varanasi: Chaukhamba Sanskrit Sansthan; 187.

REVIEW ARTICLE

19. Shastri KN, Chaturvedi GN. 2007. Vidyotini Hindi Commentary on Charaka Samhita, Siddhi Sthana: Chapter 12, Verse 30. Reprint ed. Varanasi: Chowkhambha Bharti Academy; 1108.

20. James M Becker, Arthur F Stucchi. Essentials of Surgery.1st ed. Noida: Elsevier; 2009. pp. 841.

21. Vagbhaţa. Aṣṭanga Hṛdaya ; Nidanasthana - 16 sloka-40, Hindi commentary - Nirmala by Dr. Brahmananda Tripathi, Chaukhambha Sanskrita Pratisthana, Delhi, 2003:541

22. Vagbhaţa. Aṣṭanga Hṛdaya ; Nidanasthana - 16 sloka-40, Hindi commentary - Nirmala by Dr. Brahmananda Tripathi, Chaukhambha Sanskrita Pratisthana, Delhi, 2003:541

23. Agnivesha,Charaka samhita of Acharya Charak,Dridhabala krit,edited by Pt.Kashi Nath Shastri and Dr.Gorakh Nath Chaturvedi,Siddhi sthan.Ch.6 Ver.62-66 edition, Varanasi: Chaukhambha Bharati Acadamy, 2007; 1028

24. Sushruta Sushruta Samhita -Text with English translation by P V Sharma. 1st ed. Varanasi: Chaukhambha Vishwabharati; 2005. Vol II. pp. 695

25. Agnivesha. Charaka Samhita with elaborated vidyotini Hindi commentary by Pt. Kashinath Shastri, Gorakhnath Chaturvedi. Varanasi: Chaukambha Bharati Academy; Reprint 1998. Vol 1. pp. 1024.

26. Dr.Rajgopal Shenoy K ,Manipal Manual Of Surgery, ,Ch.31, second edition ,CBS Publisher &distributer, 2005; 532.