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Clinical Profile of Chronic Venous Insufficiency and Varicose Veins of Lower Limbs and Management in North Costal Andhra Region

Sarangam Venkata Satya Narayana Rao[1], Palaka Srinivasa Rao[2], K. Phani Jotsna[3], U. Grace Lalitha Priya[4], Tanneru Surendra[5], Narashima Ajay[6], Aachi Srinivas[7]

[1]Professor and Head, [2]Assistant Professor [3,4,5,6]P.G Resident, [7]Professor, Dept of Surgery, Great Eastern Medical School and Hospital, Srikakulam, Andhra Pradesh 532484, India.

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Abstract

Background: Chronic venous insufficiency of lower limbs is a common medical problem encountered by people atlarge in North-costal region of Andhra Pradesh and adjoining Odisha state. The presentation of symptoms varies from asymptomatic to cosmetic ones and if not treated in time, will lead to serious complications such as varicose ulcer and Deep vein thrombosis. Varicose veins of lower limbs is the most common peripheral vascular disease which needs proper evaluation and management. Hence the present study was undertaken to evaluate the various clinical aspects and modalities of treatment adopted for chronic venous insufficiency and varicose veins in this region. *Methods:* The study was conducted for a period of 2 years from February 2015 to January 2017 at GEMS and Hospital, Srikakulam, Andhra Pradesh. A total of 50 patients with Primary Varicose Veins were selected from among the admitted cases for the study. After thorough clinical examination, relevant biochemical and radiological studies were done. The patients were categorized and operated upon. The postoperative follow-up was also done. *Results:* In the present study, it was observed that varicose veins affect middle-aged adults (20-60 years) more commonly. Most of the patients were males (84%) and majority of them sought medical consultation for complications (22%). Long saphenous venous system involvement was seen in 60% of cases and 12% cases had both long and short saphenous venous system involvement. A good number of patients had also perforator incompetence. Saphenous-femoral flush ligation with stripping was the best surgical procedure adopted for great saphenous venous involvement and no recurrences were reported during the follow-up period. *Conclusion:* Surgical management was the main stay of treatment for patients with chronic venous insufficiency and varicose veins associated with complications. Flush ligation of Sapheno-femoral junction with stripping for great saphenous vein and sub-fascial ligation for perforators incompetence were found to be the best surgical procedures and yielded good results in the present study.

Keywords: chronic venous insufficiency; Duplex doppler study; sapheno-femoral junction incompetence; Trendelenburg's surgery; varicose ulcer.

Corresponding Author: Sarangam Venkata Satya Narayana Rao, Professor and Hod, Dept of Surgery, Great Eastern Medical School and Hospital, Srikakulam, Andhra Pradesh 532484, India.

E-mail: drsatyanarayana1951@gmail.com

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Introduction

Chronic venous insufficiency of lower limbs is a common medical problem and manifests from asymptomatic to cosmetic problems. It can also present with severe symptoms such as varicose veins, edema, pigmentation, eczema, lipodermatosclerosis, atrophic blanching, venous ulcer and *deep vein thrombosis* [1,2,3,4]. Abnormal venous blood flow in lower limbs is seen in about 50% of individuals with chronic venous insufficiency.

The definition of varicose veins is much variable from clearly visible dilated, tortuous and

prominent subcutaneous veins of lower limbs according to *Arnoldi* to dilated veins secondary to valve incompetence as per *Dodd and Cockett*. The *WHO* defines it as a saccular dilatation which is often tortuous. This variation about the concept of varicose veins has lead to wide discrepancies in the reported incidence [10-30%]. The prevalence of varicose veins varies from 02 -20% with lower reported incidence in Asian population and higher one in western society [5].

There are some known pre-disposing and risk factors for varicose veins such as advancing age, prolonged standing, sedentary lifestyle, lower extremity trauma, obesity, smoking, deep vein thrombosis, presence of artery-venous shunt, pregnancy, high estrogen states etc.

In recent times considerable knowledge has been acquired regarding the anatomy, pathophysiology and clinical manifestation of varicose veins of lower limb. The most important of these have been about the clear concept about the venous pressure of superficial and deep veins of lower limbs in erect posture, during rest and exercise. Over and above the role of venous hypertension and the function of musculo-venous calf pump is well understood in the development of varicosities in lower limb. The venous drainage of lower extremity is effected due to communication between superficial venous system and deep system through perforators or communicating veins. The perforators have a complex and highly variable anatomy, in arrangement, in their inter- connection and size. They are numerous in number and play a key role in maintaining equilibrium during blood flow when calf muscle contractes and also prevents reflux from deep to superficial venous system. There are four clinically significant perforator groups i.e upper thigh (*Hunterian*), lower thigh (*Dodd's*), at knee level (Boyd's) and in the calf region (*Cockett's*). Effective venous drainage is maintained due to uni-directional blood flow and competence of valves. Any pathology like venous hypertension, change in venous structure, inflammation, venous outflow obstruction or calf pump failure and incompetence of valves will lead to chronic venous insufficiency and varicose veins in due course of time [6].

The Edinburgh Venous study (EVS) published in 1998 revealed that 39.7% of men and 32.2% of women has had dilated tortuous trunk of the *long saphenous* and or *short saphenous* vein and their first or second order tributaries. And 80% had *webs* or *small reticular* varicosities. The *EVS* study *further* indicated that the incidence of varicosities rose with increasing age i.e 11.5% in age group of 18-24 years to 55.7% in the age group of 55-64 years [7]. Varicose veins are as common in men as in women as per published population studies. Although varicose veins are less common in developing countries like India, adequate epidemiological studies and data are needed in this context.

Brodie-trendelenberg test 1 and 2-indicates	SFJ incompetence and perforator incompetence
Oschners Mahoners test	Site of perforator incompetence at thigh, knee and ankle level.
Modified pethes test	Deep vein thrombosis.
Schwartz test	Superficial column of blood continuous between 2 Fingers and valvular incompetence.
Fegans test	Locate perforators in the deep fascia
Morrisons cough test	SFJ incompetence

Hence, efforts are made for early detection, control and management of chronic venous insufficiency and varicosities of lower limb in this north costal region.

Materials and Methods

The present study was a hospital based, prospective and observational study enrolling 50 patients with symptoms of primary varicose veins admitted to Department of Surgery, Gems and Hospital, Srikakulam (Andhra Pradesh) from Feb 2015 to Jan 2017. Ethical clearance from the institutional committee was obtained before the start of the study.

Selection Criteria

Inclusion criteria

1. Patients clinically diagnosed as primary varicose veins of lower limb either unilateral or bilateral in both Males and Females.
2. Patients presenting as varicose veins with complications.
3. Patients willing to participate in the study.

Exclusion criteria

1. Patients with recurrent varicose veins and concurrent deep vein thrombosis in lower legs.
2. Patients with secondary varicosities due to

pregnancy and pelvic tumors.

Study design

Patients admitted with symptoms of primary varicose veins, a detailed history was taken and tests related to diagnosis for varicosities were done. Then, relevant Biochemical investigations and color Doppler studies were done before being categorized for surgery.

Colour Doppler ultrasound study

It is a sensitive and result oriented radio-imaging study performed in patients with primary varicose veins which shows the findings as.

The Color Doppler study would locate:

- Sapheno-femoral junction incompetence
- Sapheno-popliteal junction incompetence
- Perforator incompetence
- Deep venous thrombosis
- Unnamed or abnormal perforators

The sites of perforator incompetence were also marked by indelible skin pencil before surgery.

Intra-operative findings

As per the categorization of the patients, the following surgical procedures were done.

- S.F.J flush ligation with stripping of LSV with incompetent perforator ligation. 26 cases
- S.F.J flush ligation with incompetent perforator ligation 07 cases
- S.F.J, S.P.J ligation with stripping of L.S.V with incompetent perforator ligation. 06 cases
- S.P.J ligation without stripping of S.S.V with incompetent perforator ligation. 03 cases
- Incompetent perforator ligation. 08 cases

The intraoperative findings were recorded in the clinical proforma.

Follow up

The patients were discharged within a period of 07-10 days of surgery with advice regarding diet, rest, drugs, type of work and to avoid long standing and usage of elastic crepe bandage for a period of 03-06 months.

They are also further counseled to attend for check- ups once in 15 days for

01 month and once in a month for a period of 06 months.

During the check ups, the operated limb was examined for symptomatic relief, healing of wounds or ulcers, appearance of any scar, presence of tenderness and recurrence etc.

Statistical analysis used

Standard statistical method, like SPSS was adopted for the analysis.

Results

50 Patients with primary varicose veins were enrolled, investigated and undergone surgery as categorized. Their results were analysed and data complied.

A clinical classification and grading of chronic venous disease is essential to characterize wide range of symptoms and signs in varicose veins.

The *Ceap Classification* developed by American venous forum for *C.V.I* is discussed herewith:-

Table 1: CEAP classification of chronic venous disorders

Clinical classification (C)

C_0 No visible sign of venous disease

C_1 Telangiectases or reticular veins

C_2 Varicose veins

C_3 Edema

C_4 Changes in skin and subcutaneous tissue

(A) Pigmentation or eczema

(B) Lipodermatosclerosis or atrophic blanche

C_5 Healed ulcer

C_6 Active ulcer

Etiological classification (E)

E_C Congenital (Klippel- Trenaunay syndrome)

E_P Primary

E_S Secondary (eg postthrombotic syndrome, trauma)

E_n No venous cause identified

Anatomic classification (A)

A_S Superficial

A_d Deep

A_P Perforator

A_n No venous location identified

Pathophysiologic classification (P)

P_r Reflux

P_o Obstruction, thrombosis

$P_{r,o}$ Reflux and obstruction

P_n No venous pathophysiology identified.

However the CEAP system is not very useful for grading chronic venous diseases since many of its components are relatively static and clinically not indicative. Hence the venous clinical severity scoring system came into usage and is a better clinical working classification to indicate severity and evaluation of the chronic venous disorders.

An aggregate score for the limb is calculated by adding the individual components scores. The range of total score is 0-30 (Table 2).

The common age group encountered in the study was between 41-60 years. (44%) (Table 3)

Malhotra et al. has reported an age range of 18-65 years [8], Wright et al. had reported an age range of 20-75 years in their study [9] which correlates with the present study.

In the present study, 42 were males and 08 were females. The incidence of varicose veins was more in Males than in Females with M: F ratio [5:1]. Widmer recorded M: F ratio of 1:1, Callam etal recorded a ratio of 1:2 in their study [10,11] (Table 4).

Table 2: Venous clinical severity score

Attribute	Absent = 0	Mild = 1	Moderate = 2	Severe = 3
Pain	None	Occasional, not restricting daily activity	Daily, interfering but not preventing daily activity	Daily, limits most daily activity
Varicose veins	None	Few, isolated branch varices / clusters including ankle flare	Confined to calf or thigh	Involves calf and thigh
Venous edema	None	Limited to foot and ankle	Extends above the ankle but below knee	Extends to knee and above
Skin pigmentation	None or focal	Limited to perimalleolar	Diffuse, over lower third of calf.	Wider distribution above lower third of calf
Inflammation	None	Mlid cellulitis, ulcer margin limited to perimalleloar	Diffuse over lower third calf	Wider distribution above lower third of calf
Induration	None	Limited to perimalleolar	Diffuse over lower third of calf	Wider distribution above lower third of calf
Ulcer number	0	1	2	>3
Ulcer duration	NA	<3 months	>3 months but <1 year	Not healed >1 year
Ulcer size	NA	Diameter < 2 cms	Diameter 2-6 cms	Diameter >6 cms
Compressive therapy	Not used	Intermittent	Most days	Full compliance

Table 3: Age distribution

Age groups (years)	No. of cases	Percentage
11-20	03	06
21-30	10	20
31-40	09	18
41-50	10	20
51-60	12	24
>61	06	12
Total	50	100

Table 4: Sex Distribution

Gender	No.of Cases	Percentage
Male	42	84
Female	08	16
Total	50	100

Table 5: Symptomatology

Symptoms	No. of Cases	Percentage
Dilated and tortuous vein	46	92
Pain in limb	33	66
Limb edema	09	18
Venous Ulcer	13	26
Others (skin changes etc)	19	38

Patients presented with varied symptoms, out of which dilated veins was most common in 46 cases (92%) followed by aching pain in 33 cases (66%). These findings correlate well with studies reported by W.B. Campbell et al. with cosmetic symptoms being 90% and aching pain 57% [12] (Table 5).

Table 6: Venous System Affected

Venous-System Affected	No. of Cases	Percentage
Great saphenous system	30	60
Short saphenous system	05	10
Both systems (Superficial & deep)	06	12
Only perforator system	09	18
Total	50	100

Great saphenous venous system was most commonly affected by varicosities in 30 cases (60%). Both systems are affected in 06 cases (12%) in the study group. Delbe and mocquet reported varicosity of long saphenous vein in 98% and 2% in short saphenous vein in their study (Table 6).

Table 7: Site of Incompetence of Perforators

Findings	Clinical Signs	Colour Doppler	Intra Operative Findings
Thigh	08	11	08
Below knee	31	34	32
Above ankle	42	44	43
Unnamed	29	30	26
Total	110	119	109

In the present study, 110 incompetent perforators were detected Clinically and 119 by Doppler duplex study and 109 during Surgery. The most common perforators detected clinically were above ankle in 42 cases, 43 intra operatively and 44 with Doppler study (Table 7).

Table 8: Limb Involved with Varicosities

Lower Limb	Present Study	A.H.M.Dur, A.J.Mackaay et al.
Right	28%	48.55%
Left	44%	51.45%
Both Limbs	28%	-----

Left lower limb was more affected in the present study group (44%) which is comparable with A.H.M. Dur, A.J. Mackaay et al. study [13] (Table 8).

Table 9: Type of Surgical Procedure

Surgery Performed	No. of Cases	Percentage
SFJ flush ligation with stripping of LSV with perforator ligation	26	52
SFJ flush ligation with incompetent perforator ligation	07	14
SFJ, SPJ ligation with stripping of LSV with incompetent perforator ligation	06	12
SPJ ligation without stripping of SSV+IP ligation	03	06
Incompetent perforator ligation	08	16
Total	50	100

Trendelenberg surgery (SFJ flush ligation with stripping of LSV upto knee joint) was the most commonly performed surgery in 26 cases (52%) in the study group. These procedures were done individually or in combination with others as per venous system involved; Janugada HB et al. [14] (Table 9).

Table 10: Post Operative Complications

Complications	No. of Cases	Percentage
Bleeding	00	00
Hematoma	05	10
Delay healing	02	04
Pain	02	04
Wound infection	04	08
Recurrence	00	00
Others	02	04

Hematoma was the most common post operative complication seen in 05 cases which was managed conservatively.There was no incidence of deep vein thrombosis or recurrence in the study group. Nisar A et al. reported haematoma in 24% of cases [15] (Table 10).

Table 11: Comparative Accuracy of Clinical with Intra Operative Findings

Sensitivity	44/44	100%
Specificity	2/6	33.33%
Positive Predictive Value	44/48	91.66%
Negative Predictive Value	2/2	100%
Accuracy	48/50	96 %

Clinical	Intraop-Findings		Total
	Positive	Negative	
Positive	44	4	48
Negative	0	2	2
Total	44	6	50

Clinical examination has a high predictive accuracy of 91.66% in the diagnosis of varicose veins, where Doppler facilities are not available. (Table 11).

Table 12: Comparative Accuracy of Clinical Findings with Colour Doppler Duplex Study.

Clinical	Colour Doppler		Total
	Positive	Negative	
Positive	47	1	48
Negative	0	2	2
Total	47	3	50

Sensitivity	47/47	100%
Specificity	2/3	66.66%
Positive Predictive Value	47/48	97.9%
Negative Predictive Value	2/2	100%
Accuracy	48/50	96 %

Colour Doppler study has an overall accuracy of 94% which is higher than the clinical predictive accuracy [91.66]. Masudaem et al. had reported an overall accuracy of 88% with Duplex scanning study which correlates with the present study [16] (Table 12).

Table 13: Comparative Accuracy of Colour Doppler with Intra-Operative Findings.

Colour Doppler	Intra Operative Finfdings		Total
	Positive	Negative	
Positive	45	2	47
Negative	0	3	3
Total	45	5	50

Sensitivity	45/45	100%
Specificity	3/5	60%
Positive Predictive Value	45/47	95.7%
Negative Predictive Value	3/3	100%
Accuracy	47/50	94%

Fig. 1: Varicose veins with Venous ulcer of left lower limb.

Fig. 2: Shows Flush ligation at sapheno-femoral junction.

Fig. 3: Shows stripping of Great saphenous vein with Myer's stripper.

Fig. 4: Shows Varicose veins before surgery and after surgery of left foot

Discussion

Chronic venous insufficiency and varicose veins are progressive diseases and the exact cause is not known even now. Hence, many hypothesis exist

about its etiology. However, for venous ulcer, fibrin cuff hypothesis and white cell trapping theory has been advocated. It is now documented that ambulatory venous hypertension is the only accepted cause of venous ulceration. Again, the management of varicose veins has been more symptomatic than curative.

Hence, post-operative follow-up of cases is mandatory to detect complications and recurrence. At present there are multiple modalities of treatment available for varicose veins. Surgery is the main stay of treatment and yielded good results for varicose veins in the present study. The surgical procedure is mainly based on involvement of saphenous system, presence of incompetent perforators. Sapheno-femoral incompetence and complications such as edema of leg and venous ulcer.

In the present study, 50 cases of primary varicose veins were enrolled, investigated, operated and followed-up. The results were analyzed. The age incidence in the study group ranged from 18-70 years. Malhotra et al reported an age range of 18-65 years in their study from South and North India [8]. Wright et al reported an age range of 20-75 years in their study [9]. The sex incidence in the present study group has shown a Male pre-ponderence [84%] with Male:Female ratio of 5:1. Widmer had recorded a sex ratio of 1:1 [10]. Callam et al. reported a ratio of 1:2 [11]. The decreased incidence in females in the present study group may be due to lack of awareness of cosmetic symptoms and low prevalence of health consciousness in this backward region.

Moreover, short stature of women and resistance to complications of varicose veins probably due to hormonal influence has some impact on venous hypertension as well muscular activity were responsible for low incidence in women.

The commonest symptoms in the study group was dilated tortuous veins in 46 cases (92%) followed by pain in the affected limb in 09 cases (18%). W B Campbell et al. reported cosmetic symptoms in 90% cases and aching pain in 57% in their study, which very well correlates with the present study [12].

The Edinburg venous study (EVS) had also reported similar symptoms in their population study. Great Saphenous system was commonly involved in 30 cases (60%) followed by Short Saphenous vein in 10% and both groups in 12% of cases in the present study. These findings also well correlates with the study of Delby and Mocquet who reported varicosities of long saphenous vein in 98% and short saphenous vein in 2% of cases. Left lower limb was more affected with varicosities in 44% of cases in the study group which well correlates with the study of A.H.M. Dur, A.J.C. Mackaay et al. [13]. Left lower limb varicosities are more common probably due to more tortuous course of left side veins through the pelvis with the left common iliac vein being traversed by right common iliac artery and also constant pressure exerted by loaded sigmoid colon over the veins in the pelvic cavity.

Sapheno-femoral flush ligation with stripping of long saphenous vein by Myers stripper up to knee joint and ligation of incompetent perforators were done in 26 cases. Sapheno - femoral flush ligation without stripping of LSV and ligation of incompetent perforators were done in 07 cases. SFJ and SPJ ligation with stripping of LSV with incompetent perforator ligation was done in 06 cases. SPJ liagation without stripping of SSV and incompetent perforator ligation was done in 03 cases. Exclusively incompetent perforator ligation was done in 08 cases. These procedures were done individually or in combination with others depending upon venous system involved. Janugade HB et al. had reported similar surgical procedures in their study for varicose veins [14].

In the present study 15 cases developed complications, the commonest being hematoma in 05 cases which was managed conservatively. There was no incidence of Deep vein thrombosis or recurrence in the study group. Literature reports that DVT and Pulmonary embolism are extremely low (0.01%).

Nisar A et al. reported 24% of haemoatoma following venous stripping in their study[15]. Haematoma formation was due to tissue trauma as a result of venous stripping. This incidence of haematoma and post-operative pain were reduced with local anaesthetic flush as per randomised controlled trial of Nisar A et al. reported in Eur J Vasc Endovasc Surg. 2006 Mar; 31(3):325-31. In the present study, 110 incompetent perforators were clinically assessed, 119 by Doppler duplex study and 109 during surgery. The most common perforators detected clinically were above ankle in 42 cases,43 intra-operatively and 44 with Doppler study.

The Doppler duplex study in chronic venous insufficiency and varicose veins was an essential non-invasive, radio-imaging study which has an over all accuracy of 94%. Masud E.M et al. reported 88% accuracy with Doppler study which co-rrelates

with the present study [16]. Clinical assessment detects S.F.J incompetence in all cases confirmed during surgery making clinical sensitivity accuracy to be 100%. The positive predictive value of clinical assessment was 91.66%. Clinical examination also reported negative in 02 cases of S.F.J incompetence, which was confirmed intra-operatively. The negative predictive accuracy of clinical examination was 100%. The clinical assessment shows an overall accuracy of 96% in the present study.

Color Doppler detected all cases of S.F.J incompetence found intra-operatively, giving the test a high sensitivity of 100%. Doppler study also reported negative in 03 cases out of 05 cases which was confirmed during surgery. Hence the specificity of the Doppler study was of 60%. The positive predictive accuracy of color Doppler for S.F.J incompetence was 95.7% when clinical accuracy stands at 91.66%. The negative predictive accuracy of Doppler study for S.F.J incompetence was 100%, and thus making it a primary and essential investigation before surgery.

Patients with varicose veins are initially managed with conservative treatment using graduated compression stockings. It provides graded external compression to the leg and oppose the hydrostatic forces of venous hypertension. There is no difference between knee length and thigh length graduated compression stockings for prevention of *DVT* in post operative patients. Stockings with compression pressure between 20-30 mmHg, for patients with varicose veins with or without edema and for advanced varicosities with skin change or ulcer compression pressure between 30-40 mmHg are recommended.

In patients with recurrent ulcers, stockings with pressure between 40-50 mmHg are advised. Current guidelines recommend compression therapy using moderate pressure between 20-30 mmhg for patients with symptomatic varicose veins who are not considered for surgery.

Venoactive drugs like flavinoids,micronized purified flavonoid fraction (MPFF), and horse chestnut seed extract are currently in practice to relieve pain and swelling in chronic venous insufficiency and Varicose veins. MPFF in combination with compression stockings are used in clinical practice and would accelerate the healing of varicose ulcers. Sclerotherapy using chemical irritants such as polidocanol, sodium tetradecyl sulfate, ethanolamine oleate, sodium morrhuate etc are in cinical usage. It can be used alone or in combination with surgical procedures in patient with telangiectases, reticular veins, small varicose veins and venous segment with reflux. Ultrasound guided foam sclerotherapy with polidocanol is also in current practice.

Endovenous thermal ablation (EVLA) and Radiofrequency ablation (RFA) are both endovenous thermal therapies now in current use. Both are frequently used for GSV reflux and have substituted the General surgical procedures because of reduced convulsions and pain with similar efficacy. ELVA and RFA both showed the same safety and efficacy norms in terms of quality of life haematoma, thrombophlebitis, occlusion and recanalization after one year on meta-analysis.

Surgical treatment is the main stay of management for Varicose veins with complications. Trendelenbergs surgery with stripping of Great Saphaneous vein and sub-fascial ligation of incompetent perforators is currently preferred treatment by most surgeons in clinical practice.

Conclusion

The present study concludes that the chronic venous insufficiency and varicose veins are common in middle aged *Males* far less common in women. Again, left lower limb is more affected than right side. The long saphenous venous system was more commonly affected with above ankle group of perforators. Most of the patients seeked medical consultation for one or other complications of varicose veins, but not for cosmetic symptoms.

Varicose veins are quite common in this region but is quite often under diagnosed due to its varied clinical presentation and unawareness of the people about the disease. Compressive stockings are the main stay of conservative treatment for healing of varicose ulcers, but with low compliance, mainly due to feeling of tightness and warmth during usage, application difficulty, physical constraints and co-existing arterial disease etc.

Surgical management was still the main stay of treatment in our study group and yielded good results with low complications and no recurrences. Trendelenburg surgery with stripping of long saphenous vein with sub-fascial ligation of incompetent perforators was performed in majority of our cases and shown good results with fewer complications and no recurrence.

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Conflict of Interest:

The authors declare that they have no conflicts of interest.

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