

"Proposal project for establishing of advanced and dedicated endovascular suite at Port Said Central Medical Services"

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Abstract:

Background: Endovascular intervention has been considered a more recommended approach for treatment of peripheral vascular diseases. Neither the traditional operating room (OR), nor the conventional angiography suite is the best option for both open surgery and endovascular operations. Important issues include: the quality of the radiological equipment's, hazard effect of radiation, possibility of using the equipment, high qualified team, advanced skills for both open and endo approaches, sterile media, as well as improvement of patient safety. It's a more recommended approach for management of vascular diseases because of its less invasive safe procedures with a high profit, reducing hospital stay, wait time and list.

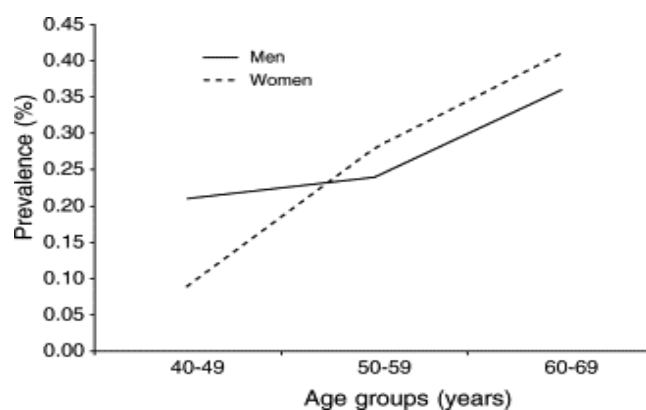
Methods: literature deal with the approach of establishing most updated endovascular suite with advanced consideration, available cost, environmental, political. Catastrophic plan, possibility of cost reduction was tried.

Results and Conclusion: management of vascular lesions in advanced endovascular suite should be highly qualified for gaining best results in the treatment of limb ischemia. Vascular surgery team uses the facilities to achieve better results. Fixed fluoroscopy equipment is recommended, than portable C-arm. Establishment of an endovascular operating room suite (hybrid) has the benefit of possibility of performing hybrid technique and open conversion if needed. So, pre-operative angiography gives anatomical description of vascular tree, and post-operative evaluation. As a consequence, high quality care and services should be afforded.

Key words: Endovascular, angiography, equipment, vascular surgery, less invasive.

INTRODUCTION:

Atherosclerosis is a systemic arterial disease that narrows the lumen due to the accumulation of lipid and fibrous material in the layer of blood vessels. Continued developments in endovascular surgery have dramatically modified in vascular treatment. So, the field of vascular becomes in need to new type of vascular experience, who can manage both endovascular and open approaches (ZHOU W et al, 2006). Our Vascular Surgery department has gone through the entire evolution of endovascular therapy, starting with portable devices, progressing to cardiac catheterization labs, and finally being able to design our first endovascular kits in an operating room environment.



The risk factors of Chronic lower limb ischemia (atherosclerosis) with a high incidence.

Fixed reasons: age (mostly over 45 years old), family history, genetic factors.

Others: salty, spicy, greasy, obesity, smoking, drug addiction. Though different sites of vascular lesions affect by common major risk factors for atherosclerosis,

these factors are:

Smoking: atherosclerosis increase in the heavy smokers up to 50% (**Criqui MH, et al, 2015**).

Hypertension : the strongest predictor of incidence 40% (**Howard DP. et al 2015**).

Dyslipidemia_: A high prevalence of hyper-cholesterolaemia is a significant to occur (33%) (**Joosten MM, et al, 2012**).

Diabetes : associated with an increased risk of incidence (22%) (**Jude EB, et al, 2011**).

Ischemic heart disease: very important risk factors with atherosclerosis (55%) (**Tzoulaki I, et al, 2017**).

Idea of The Project:

The main target of the project is establishment of endovascular suite. The use of peripheral endovascular suite for angioplasty is the new and common pathway for management of peripheral arterial diseases (PAD), by peripheral Catheterization Unit establishment. It's a less invasive maneuver alternative to open surgery to manage PAD and saving limbs. This procedure has very important role in evaluation of the vascular tree as a pre-operative assessment and clarify all details in vascular diseases (stenosis or occlusion) and interventional angioplasty (**BERGUER R,et al, 2013**).

The surgeon inserts a tube (catheter) into a femoral or brachial artery. Then, insert the catheter towards the diseased artery positioning of the catheter; contrast injection in the artery, which helps identify characters of the lesion (**FILLINGER MF, et al, 2017**).

The presence of endovascular catheter unit in the city, has a great value for giving the hand of help and support for all those who are complaining of limb ischemia, and need vascular surgery intervention with minimal invasive intervention, specially old aged with common chronic illness that stand hindrance for open surgery and anesthesia. With availability of ICU for post-operative in special cases (**SCHERRER M et al, 2013**).

The new endovascular technology provides several additional benefits, such as:

- **Increased Capacity:** Procedures are performed faster and more efficiently, meaning that can care for even more vascular patients.
- **Faster Procedures:** The full range of endovascular services can be provided faster and with greater precision, which gets patients treated and into recovery as quickly as possible.
- **Expanded Capabilities:** Even the most complex procedures can be treated in a fraction of the time and without transferring patients to other hospitals.

Vision:

We all aspire to make a difference in vascular and endovascular surgery services in our community and to the satisfaction of all patients.

Mission:

- Hold firmly on to the human and ethical values ensuring quality healthcare delivery.
- Become the preferred provider of comprehensive healthcare at an affordable cost to our customers.
- Achieve exponential growth harnessing the necessary human, technological and financial resources.
- Be the employer of choice nurturing a committed team to carry forward the mission.

- To exceed our GUESTS expectations, every day, by providing personalized high quality health services, through our expertise and extended reach.
- Help customers to have a better life, by being their expert partner.

Address:

At Port Said Specialized vascular and endovascular center in downtown of Port Said city.

Future aspirations:

To predict time that, all invasive open surgeries of vascular diseases will transform to endovascular technique? Up to 2026, we can expect 75% upto 90% of all vascular complaints will be managed by endovascular treatment. Depending on continuous courses and lectures for vascular surgeons and others, this will be more and more. Therefore, we need to expand our services to cover a wider area of the city along the canal with state-of-the-art equipment.

Methodology:

Steps of Six Sigma..

Adherents and practitioners of the Six Sigma method follow an approach called **DMAIC**. This acronym stands for define, measure, analyze, improve, and control. According to the ideology, a business may solve any seemingly unsolvable problem by following those steps:

1. The team of the center, defines a faulty process on which to focus on the process of peripheral catheterization and complications.
2. Team members evaluate the activities and efforts of angioplasty. Calculation and record of performances and list it to reach the target of the center.
3. the team analyzes the project process by isolating each input, or potential reason for the failure, and study it well.
4. The team works from to improve system performance to achieve better results.
5. The group adds controls to the project to avoid regress and become ineffective and try to keep improvement.

SWOT analysis for the project

	Favorable	Unfavorable
	strengths	Weaknesses
Internal factors	<ul style="list-style-type: none"> - Highly skilled and trained team. - The updated design of the angio suite facilitate the possibility of upgrading and development. - patients have easy access to our hospital location. - we use one of the most 	<ul style="list-style-type: none"> -competition limits efforts to some degree . -operates at 75% capacity, with high needs for endovascular intervention. -high employee turnover. -staff high salaries. - in need for high number of staff with good salaries.

	<p>technologically advanced health equipment and facilities for hybrid intervention in the city .</p> <ul style="list-style-type: none"> - The address of the center facilitate easily reach. - partnership with public health. - strong fundings. - high patient satisfaction. - the availability of well qualified paramedical staff. - A financial support through different resources for giving services. 	<ul style="list-style-type: none"> - the high cost of service and suppliers. - unclear system for incentives and rewards. - weak team of advertisement.
	Opportunities	Threats
External factors	<ul style="list-style-type: none"> - broaden partnerships relationships. -technology upgrade. -establishing great brand reputation. -increase our branding efforts. -strong referral system. -improved safety system. -government support healthcare development. - increased rate of atherosclerotic patients with risk factors. 	<ul style="list-style-type: none"> -internal misalignment between board members. -lack of shared tragic vision. -inflation that increase will definitely increase the price of all services. -the environmental instability. - precautionary measures to avoid spreading of COVID-19. - More care for advertisements and media to facilitate reaching to customers.

The strategy to turn the threats and weakness to strength and opportunities:

- Motivated recognition scheme for well-deserved employees.
- Offering competitive salaries and incentive scheme for employees to avoid turnover of employees.
- Make good deals with well known suppliers to get the maximum benefits for hospital & high quality for patients.
- Prepare good training program for employees to achieve our vision.

- Making deals and contracts with well known insurance companies to insure good traffic of patients with suitable costs for all segments of patients.
- Launching of website with different online services as consultation and bookings. Also through different social media (face , twitter, insta).
- Apply infection control rules and social distance to avoid spread of covid.
- Prepare good training programs for marketing team through experienced marketing & advertising partner.

Human Resources (HR):

The role of General Manager of the angio suite:

- Develop and implement HR strategies and initiatives aligned with the overall business strategy.
- Manage the recruitment and selection process.
- Support current and future business needs through the development, engagement, motivation and preservation of human capital.

Secretary:

The unit needs two Secretaries working interchangeably, with two years' experience and expert in English and computer science. Well qualified in Financial Accounting.

The Professors:

The unit needs four consultants to keep continuous services for citizens. They should have 5 years' experience post doctorate of vascular and endovascular surgery. With well qualified CV and recommendation letters. And they should have certificate of advanced life support course. And well-trained of using duplex ultrasound.

The Specialists:

The unit needs three vascular specialists, with three years' experience post master degree of surgery. Associated with recommendation letter and have certificate of basic life support. And well-trained of using duplex ultrasound.

Nurses:

The unit in need for three well qualified nurses of endovascular suite instruments and tools. Well-trained of infection control, and good communications with patients and in critical situations. Trained of basic life support course.

Radiology technician:

The unit in need to two well qualified technicians, well trained with three years' experience of radiology services. And well-trained of basic life support.

The courier:

The unit well be in need to two couriers for facilitating more services to doctors and patients and relative's demands. And must be trained of fire control and infection control as possible.

Marketing plan for endovascular Suite

Customers:

- Patients presented with PAD, and complaining of peripheral limb pain with neuropathy.

Market segmentation:

- People who are in risk of vascular diseases especially people in advanced age with multiple risk factors.



Marketing Strategy:

- Rely on good quality, integrate with physician and health association initiatives, and wear risk factors as part of the marketing plan.
- Offers and pones services are available along 24 hrs. /a day.

Positioning and Location:

- The suite is in a private hospital in medical center downtown in Port Said.

Reaching the customer by:

- Advertising on social media like Facebook, Instagram
- Banners in streets
- Campaigns
- Pharmacies
- TV
- Journals

Competitors:

- Governmental hospitals, Military hospitals and other Private hospitals Which has angio suite for vascular intervention.

Why do patients prefer our service?

- Our service is preferred by our customers because:
- It is simple to get to the site.
- Housing services of exceptional quality.
- Patients' privacy, rights, safety, and health standards policies are provided by experienced health care professionals with excellent quality infection control and hygiene.
- There is no long queue and no squandering of time. reducing the financial expense by enabling payment easier

The market demands:

- Establishment Endovascular Unit providing excellent with high quality operation services, excellent hotel services for accommodation after operations, high level of infection control and patient safety with the lowest financial cost possible.

The sales strategy:

- Package of operation to decrease cost by contracting with healthcare companies and universal health care insurance.

- Best Hospital reservation suites with ultra-well qualified services.
- Make offers and discount to the patient who need further general health assessment and will need extra services.
- Provide a lot off services like {radiology (diagnostic and interventional) – laboratory}.
- Make follow up for the patient after operations for two months and make discount for these patients if they need any other service.

The cost of marketing ads and social media

- is around 25000 L.E

B2B

- Contracting with the private hospitals to send the patient and we will make discount for them around 20% from the operations cost.

B2C

- Contracting with the universal health insurance Port Said Branch to convert patient who need our service to the unit.
- Contracting with health care companies as prime health care to provide their customer with our services.
- Direct contract with private companies

Cost of sales:

Number of sales:

- Expected number of operations
- 500 operations per year after 2 years

The legal and obligatory study

The legal study: the project will be subjected to the following

- Ministry of health and population (standards and policies).
- Laws governing Arab republic of Egypt for medical and engineering authority.
- Civil protection organization for accreditation of hospital safety.
- Disease control and prevention center.

The political study: the current plan of government is encouraging to invest more in health care projects and services.

The environmental study: contracting to dispose medical and non-medical waste in an environmental friendly manner by 50 LE. /Kg under supervision of environmental protection agency. Yellow box for sharp instruments, fixed to wall cannot be emptied or reused. Red bag with biohazard label, Blue bag for non-medical waste. Hand wash by soap and water or/and hand sanitizers with alcohol 70%.

The social study: Improving level of health in Port-Said and provide a less invasive management of PAD and saving limbs.

Catastrophe plan:

- Automatic fire detection and resistance system.
- Total or partial evacuation plan in case of fire or other natural disaster.
- Fire extinguisher (placed on different obvious locations with clear instructions on how to use: pull the pin, aim at fire base, squeeze handle, and stand away from fire by 6-10 feet.
- Installing fire alarm system on entire facility.
- Plan for chemical spill and waste.
- Provide working staff with evacuation plan training every 3-4 months.
- The group working is the key to achieve optimal results in different situations so training periodically is a must for best outcome and minimal loss.

Security:

- well-trained highly qualified security staff (contracting with good security agency)
- installing surveillance cameras all over the facility (video-audio).

Safety and infection control plan:

- Using personal protection equipment against covid19, hepatitis B&C
- Radiation protection jackets, gloves and googles for different chemicals

Transportation:

- Bus for working staff if needed, parking area.
- Ambulance cars for emergency cases.

Training:

Providing continuous medical education, basic life support, advanced life support, civil fire protection and evacuation training.

Table 1: calculation of assets.

Financial Study of the project

Table 2: calculation of available cash.

Current assets	Value/LE
supporting facilities	2700000
Reserve instruments (Stocks)	2100000
Banking	1500000
Total	6300000

Table3: calculation of fixed assets.

Fixed-assets	Value LE
Owning unit	4250000
Angio - suite C-arm	4100000
service supplies	9500
Establishment of the unit	1800000
Medical equipment and supplies	1600000
Extra Electronic devices	25000
Total/LE	11,784,500

Financing structure

Table 4: financing calculation.

Statement	Amount LE
The capital By (10 investors) “ 1,900,000 each”	19000000
support and Suppliers	700000
Total	19700000

After collection the data of costs, we can evaluate the capital by:

The capital is (fixed asset + current asset)

$$= 11,784,500 + 6,300,000 = 18,084,500 \text{ L.E.}$$

$$*Money\ capital / the\ capital = 8,915,500 / 18,084,500 = 49.2 \%$$

(There is a clear possibility to cover the entire needs of the unit without the need to search for external financing from the bank or others.)

*Current assets / the capital = 6300000 / 18,084,500 =

34 %

(Able to cover all demands without need other resources.)

Table5: Medical equipment and supplies.

Tools	price/LE
Different types of catheters	1390000
DC Shock resuscitation	120000
Monitors	90000
Total	1600000

Table 6: Establishment of the unit.

Tools	Number	Unit price/LE	Total price/LE
Recovery electric bed with 3 movement	3	30000	90000
Crash cart	1	10000	10000
Sterilization set	1	5500	5500
tools table	2	950	1900
cupboards	4	2500	10000
protecting operons	5	2500	12500
office	2	2900	5800
Entrance	1	13000	13000
angio bed	1	160000	160000
wheel chairs	6	1400	8400
Reception chairs	15	1250	18750
Prepare isolation of unit	1	900000	900000
Establish Electricity / water supply	1	150000	150000
General establishing of the centre	1	414150	414150
Total			1800000

Table8: Extra Electronic devices

Devices	NO	Unit price/LE	Total price/LE
Television	2	5000	10000
Computer	2	6000	12000
Printer	2	1800	2000
Telephone set	2	500	1000
Total	-	-	25000

The current costs:

Cost	Total / LE
Maintenance of center and equipment	210000
medical treatment drugs and supplies (cath. , balloons & stents)	1300000
Electricity supply	85000
Water supply	21000
phone and net	17000
Gases supply	38000
meals	125000
WC supplies	18500
Educational programs	14000
Publications	33000
Marketing fees	42000
Total / LE	1903500

Table 9: Doctor fees

Fees	Unit fees / LE	Expected number	Total / LE
Diagnostic peripheral angiogram	1400	120	868,000
Unilateral LL ilio-femoral lesion using balloon and stenting	10500	175	1,837,500
Unilateral LL fem – popliteal lesion using balloon	10000	190	1,900,000
Add stent	5300		291,000

Add Balloon	4200	110	462,000
Permanent cath.	2400	200	480,000
Porto - cath.	3250		308,750
Total / LE			5,447,250

Table 10: salaries expense / year

Categories	number	Unit LE / month	Total LE/ year
Secretary	2	2300	55200
Nurses	4	2600	824800
House keeper	2	1800	34200
Technicians	2	2600	62400
Resident doctor fees	3	6600	286000
Unit manager	1	12500	150000
Social insurance			52000
Rewards			36000
Doctors' fees			5,447,250
Total	14		6,171,850

Fixed cost = 6,171,850 LE.

Current cost = 1903500 LE.

Total cost = fixed cost + current cost

6,171,850 + 1903500 = 8,075,350 LE

Total cost / unit service

8,075,350 / 75 = 10,767 LE

Fixed cost / unit service....

6,171,850 / 750 = 8,229 LE

Current cost / unit service

1903500 / 750 = 2538 LE

Table 11:Expenditure / year

Statement	Value LE	Expenditure /year	Value LE
Medical equipment and supplies	1,600,000	30%	480,000
Extra Electronic devices	25,000	25%	6,250
Establishment of the unit	1,800,000	15%	270,000
Owning unit taxes	4,250,000	2.5%	106,250
C-arm maintenance	4100000	7.5%	307,500
Total			1,170,000

Method of cost reduction:

- **Cost control of the project** is to eradicate unimportant costs without affecting the quality of the service. And try to reduce the Spending by different ways of daily electric and water supplies by choosing Scouts are less consumed for electricity and use electric faucets to rationalize water consumption. So, monitoring of the budget is serious for success of the project.

**** Seek process improvements:****Studying for different approaches to reach to the target.**

- It is accessible to finish duties **remotely** instead of attending the office, as fulfillment reports and paper through remote software out of the center, lead to money-saving process changes.

- Reduction extent of the project, by controlling number of tasks and interventions out of the scope of endovascular for saving all facilities to serve particular patients.

**** Review workload estimates:**

- Time of work is 8 hours a shift to finalize tasks, or some duties. But sometime may require renegotiation with some team members.

Table 12: The recommended and targeted Annual revenues

Intervention Description	Unit cost / LE	Expected targeted number	Total income / LE
Diagnostic peripheral angiogram	3250	250	812,500
Unilateral LL ilio-femoral lesion using balloon and stenting	20000	175	3,500,000
Unilateral LL fem – popliteal lesion using balloon	19000	290	5,510,000
Add stent	11000	165	1,815,000
Add Balloon	7500	110	825,000
Permanent cath.	4500	200	900,000
Porto - cath.	5000	180	900,000
Total / LE			14,262,500

Table 13 : The targeted recommended profits:

The profits = annual revenues – (total cost + depreciation schedule)

Value	spending
8,075,350	Total cost / year
1,170,000	Expenditure / year
9,245,350	Total
5,017,150	Profit

**** The expected profits**

The expected profits= annual revenues – (total cost + depreciation schedule)

After the first year: Add 20% for revenues, And 10% for salaries and current cost.

Table 14 : The general income statement for the fiscal year 2022

value	Expenses	value	revenues
8075350	expenses/year	14262500	Annual revenue
1170000	Depreciation schedule /year		
9245350	Total		
5017150	Profit		

Table 15: calculation of the profit.

The profit = revenue – cost

year	revenue	Cost	profit	Profit after tax (80% P)
2022	14262500	9245350	5017150	4013720
2023	17115000	10052885	7062115	5649692
2024	20538000	10941173.5	9596826.5	7677461.2
2025	24645600	11918290.9	12727309.1	10181847.3
2026	29574720	12993119.9	16581600.1	13265280.1
2027	35489664	14175431.9	21314232.1	17051385.7
mean	23604247.33	11554375.2	12049872.13	9639897.717

Net profit means: 9639897.717 LE

Profit (mean) /revenues (mean) = 9639897.717 / 23604247.33 = 0.41

Indicate good cost management.

Profit (mean) /capital = 9639897.717 /20700000 = 0.47

indicate efficiency of using resources.

Profit (mean) / fixed asset = 9639897,717 / 11784500 = 0.82

indicate efficiency of using fixed assets.

Profit (mean) / current assets = 9639897,717 / 6300000 = 1.5

indicate efficiency of using current assets without selling, shares, and bonds.

Profit (mean) /money capital = 9639897,717 / 8915500 = 1.08

indicate efficiency of allocating money to cover expenses and to maximizing profit without asking for loans .

Table 16 : Statement of cash flow LE:- Revenues - (salaries + current cost) LE

year	revenue	cost	balance+/-
2022	14,262,500	8,075,350	6,187,150
2023	17,115,000	8,882,885	8,232,115
2024	20,538,000	9,771,173.50	10,766,827
2025	24,645,600	10,748,291	13,897,309
2026	29,574,720	11,823,120	17,751,600
2027	35,489,664	13,005,432	22,484,232
mean	23,604,247.3	10,384,375	13,219,872

Table 17 : Calculate the payback period

year		profit	remainig amount	payback
2021	19700000	0	0	0
2022	19700000	5017150	14682850	frist year
2023	14682850	7062115	7620735	second year
2024	7620735	9596826.5	-1976091.5	third year

Table 18 : Net profit distribution annually

Distribution items	%	Value /LE
Reserve	20%	2,409,974.43
Investment	20%	2,409,974.43
Distribution (owner, shares workers	40%	4,819,948.85
Pessimistic assessment	15%	1,807,480.82
CRISES	5%	602,493.61

Development plan for endovascular suite

1. Building together a scientific research team to search for, discover, and create new therapeutic procedures.
2. Using advanced equipment that keeps pace with the latest developments.
3. Expansion of the number of rooms and beds available to accommodate patients, as well as the number of ambulances available.
4. Increasing the number of branches established inside the Republic.
5. Contracting with comprehensive health insurance and governmental and non-governmental hospitals that do not provide the services available to us.
- 6- Assigning the best hand experts in peripheral catheterization.

Crisis predictions:

1- Failure of the IT system:

The defect or malfunction of the IT system results in disturbance of the normal flow of duties in the hospital. Interruption of the data. So, all employers can't reach file system and patients' data.

2- Trojan , virus, hacking :

By hacking on the network and system of the center. The data of customers copied and destroyed. If detected later, the patients' information may be lost or stolen. The hospital might be under penalty of law and all safety measures should be planned well.

3- Defect in the application systems:

It is necessary for inserting patients' data for adequate treatment of patients, the hospital collecting data system must be saved and protected to keep functions and services as recommended. The technician team of the center is responsible to solve the problem rapidly, as doctors always need patients' data immediately during giving service.

4- Loss of power for more than 48 hours:

This problem is dangerous and critical for interpreting the service to customers. Specially for more than two days. This will result in gradual regress in services that given by the center that needed by visitor who seeking for help. Also, affecting connection outside of the unit causing limitation to give best treatment.

5- Flame (smoking inside)

Immediate evacuation of the center is a must by occurrence of fire spread and unit deterioration. This is a dangerous situation, need urgent proceedings for saving people inside.

6- Deficient water supply:

The source of clean water and center supply is highly significant. So, facilitating the availability of clean water for drinking, facilitating for performing interventions and for keep the place clean.

7- Spilling of dangerous materials:

The hazardous materials are used every time for different purposes like disinfectants, surgical gases and fluids and chemical drugs. Spilling in large amount has greater effect on surroundings resulting in more susceptibility of contaminations.

Conclusion:

The upgrading in the management of vascular lesions by an updated less invasive technique. The endovascular approach is considered the recommended way to manage different vascular complaint of stenosis, occlusion and dilatation. This requires a new expertise of the vascular surgeons for preparing better care for patients.

Depending on using a new portable C-arm in the center to facilitate helping patients and relieve their complaints.

To reach to higher quality of service in the center to patients, by creating an optimal working environment. Upgrading the field of operation using a fixed fluoroscopy unit for endovascular treatment. The increase of costs just for getting better view by high quality image, and using less contrast and decrease dose of radiation. This will get and improve the services. The realization of an endovascular suite is essential for large vascular centers.

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