RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Programme Structure and Course Details

Of

M.CH Vascular Surgery 2022 onwards

M.S. Ramaiah University of Applied Sciences

Ramaiah Medical College

M.S. Ramaiah University of Applied Sciences * Bangalore - 560054 *

Shalini
Principal and Dean

Dean - Academics
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Programme Specifications

M.CH Vascular Surgery Programme 2022

onwards

Programme Code: MD158

M.S. Ramaiah University of Applied Sciences

Ramaiah Medical College

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Bangalore-560054

Dean - Academics
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University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavors. We inspire critical thinking, personal development and a passion for lifelonglearning. We serve the technical, scientific and economic needs of our Society.

Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instill the spirit of entrepreneurship in our youth to help create more career opportunitiesin the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmentalprogramme

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Program Specifications: M.Ch Vascular Surgery

Faculty	Ramaiah Medical College
Department	Vascular & Endovascular Surgery
Program	M.Ch Vascular Surgery
Program Code	M.CH158
Dean of Faculty	Dr Shalini C Nooyi
Head of the Department	Dr. Sanjay C. Desai

1. **Title of the Award:** MCh Vascular Surgery
2. **Mode of Study:** Full-Time
3. **Awarding Institution /Body:** M. S. Ramaiah University of Applied Sciences, Bengaluru
4. **Joint Award:** Not Applicable
5. **Teaching Institution:** Ramaiah Medical College
6. **Date of Programme Specifications:** September 2022
7. **Date of Programme approval by the academic Council of MSRUAS :** 27th September 2022
8. **Programme Approving Regulating Body and Date of Approval:** National Medical Council of India
9. **Rationale for the Programme**

The purpose of PG education is to create specialists who would provide high quality healthcare and advance the cause of science of Vascular & Endovascular Surgery through research & training. Vascular & Endovascular Surgery is a highly specialized and technical discipline in clinical medicine comprising treatment with Open Vascular Bypasses & Endovascular Procedures Such as Angioplasty and Peripheral arteries along with laser ablation of varicose veins With a view to update, by inclusion of newer topics, and to provide a uniform syllabus and course contents in Indian universities and teaching medical institutions, the proposed guidelines provide course outlines based on recent developments in clinical medicine and other disciplines related to Vascular & Endovascular Surgery.

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Programme objectives (PO) for Vascular & Endovascular Surgery Postgraduate students

PO1. The purpose of training programs in the specialty of Vascular Surgery is to Produce competent individuals, who are able to meet the health care needs of the Society. (A, C)

PO2. To develop new tools and skills in surgical and simulation labs and to transfer these Skills to real cases, in terms of reduced time taken, fewer errors and decreased Patient discomfort.(C,P)

PO3. To shorten the length of learning curve when acquiring skills to perform on patients and to provide cost effective method of training (A.P)

PO4. Vascular Surgical skills and endovascular skills being different from general surgical skills, they have to be imparted at the heric level first in wet labs and simulation laboratories before the trainees are exposed to real patients. (A,C,P)

PO5. To improve cognitive skills in decision making, judgement and communication and to define proficiency levels & to ensure one has the ability for independent and competent practice. (C, A,P)

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Programme specific outcome (PSO) for Vascular & Endovascular Surgery Postgraduate students

PSO1-To develop knowledge levels and to hone skills to handle elective vascular surgical problems. (C, P)

PSO2 - To expose and train individuals to plan and operate on vascular emergencies and nontrauma vascular problems and vascular trauma patients. (A, P, C)

PSO3- To provide of equip skills to diagnose, plan, treat and to follow-up vascular patients.

PSO4- To detect early signs and symptoms of vascular diseases and to streamline management protocols. (C, A)

PSO5-To update recent knowledge and to keep in pace with rapid advances in the progress of vascular Surgery and endovascular techniques. (A, P)

PSO6-To sensitize the trainee to newer learning methods and research tools & to encourage clinical research. (C, P)

PSO7- To plan and execute mass screening programs and organize preventive Methodologies. (A, P)

PSO8- To publish. Papers in indexed journals e.g., Article, short papers, short case reports, clinical reviews, research papers during the training period. (A, P, C)

Note: A- Affective Domain, C- Cognitive Domain & P- Psychomotor Domain

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Course-PO-PSO Mapping

Course Code and name	Program Outcomes				Program Specific Outcomes					
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MCHC509A Basic Sciences applied to Vascular Surgery	2	1		2	1		2	3	1	3
MCHC510A Vascular Surgery	3	3	2	3	3	3	3			2
MCHC511A Vascular and Endovascular Surgery		3	2		3	3	3			
MCHC512A Recent advances in Vascular Surgery	2	2	3	2	1		3	2	2	3

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10. Regulations:

(A) Attendance, Progress and Conduct

1. A candidate pursuing degree course should work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run or work in clinic/laboratory/nursing home while studying postgraduate course. No candidate shall join any other course of study or appear for any other examination conducted by this university or any other university in India or abroad during the period of study.
2. Each year shall be taken as a unit for the purpose of calculating attendance. Attendance of 80% every term is mandatory for appearing in the final university examination.
3. Every student shall attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons.
4. Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate course. Provided further, leave of any kind shall not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.
5. Any student who fails to complete the course in the manner stated above shall not be permitted to appear for the University Examinations.

(B) Monitoring of progress of Studies

1. Work diary / Log Book - Every candidate shall maintain a work diary and record of his/her participation in the training programs conducted by the department such as journal reviews, seminars, etc. as per the model checklists and logbook specimen copy.
2. Special mention may be made of the presentations by the candidate as well as details of clinical or planning procedures, if any conducted by the candidate. The work diary shall be scrutinized and certified by the Head of the Department and Head of the Institution, and presented in the university practical/clinical examination.
3. Procedure for defaulters: There will be a committee constituted by all teachers to review such situations. The defaulting candidate is counselled by the guide and head of the department. In extreme cases of default, the departmental committee may recommend that defaulting candidate will be withheld from appearing the examination, if she/he fails to fulfil the requirements in spite of being given adequate chances to set himself or herself right.

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11. Teaching Learning Methods:

This being a highly dedicated PG specialty introducing several new concepts/subjects in the course, it is recommended to divide the entire course into two components consisting of First Year of BASIC CONCEPTS OF THE SPECIALTY and the next two years of INTENSIVE CLINICAL TRAINING IN THE SPECIALTY.

Didactic lectures are of least importance; seminars, journal clubs, symposia, reviews, and guest lectures should get priority for acquiring theoretical knowledge. Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. Students should have hands-on training in performing various procedures and ability to interpret results of various tests/investigations.

Exposure to newer specialized diagnostic/therapeutic procedures should be given. Importance should be attached to ward rounds especially in conjunction with emergency admissions. Supervision of work in outpatient department should cover the whole range of work in the unit.. The development of independent skills is an important facet of postgraduate training.

The training techniques and approach should be based on principles of adult learning. It should provide opportunities initially for practicing skills in controlled or simulated situations. Repetitions would be necessary to become competent or proficient in a particular skill. The more realistic the learning situation, the more effective will be the learning.

Clinical training should include measures for assessing competence in skills being taught and providing feedback on progress towards a satisfactory standard of performance. Time must be available for academic work and audit. The following is a rough guideline to various teaching/learning activities that may be employed:

1. Interdepartmental discussions and planning for optimum patient care.

2. Ward rounds along with emergency admissions.

3. External rotation postings in departments like Radiology and Cardiac surgery.

5. Skills training

6. Conferences, Seminars, Continuing Medical Education (CME) programs.

7. Journal Club

8. Research Presentation and review of research work.

9. A postgraduate student of a postgraduate degree course in Super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

10. Participation in workshops, conferences and presentation of papers etc.

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11. Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.

12.M.ch Postgraduate students shall be required to participate in the teaching and training programmer of Postgraduate & Undergraduates students.

14 Department should encourage e-learning activities.

12. Innovative teaching learning practices

1. Theme based teaching learning activities.

2. Focused discussion during journal club inculcates culture in the areas of research and publication

4. Faculty Lecture during 4th week: Helps in bridging the gap between what is presented during the month and what is not about particular topic. Also it reinforces learning

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13. Assessment: It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students, but also students to evaluate themselves. The monitoring will be done by the staff of the department based on participation of students in various teaching/learning activities.

1. Formative assessment during 4th week of every month to include methods like pedagogy, chart analysis, histopathology report analysis, Viva, standardized patients, MCQs, Open book exams, OSCE will be done. Impact: SWOT analysis can be done and timely counselling can be done.
2. Theory paper covering Vascular & Endovascular Surgery at the end of 1st year. FA at the end of second year will be on common cancers such as Head and neck, breast and cervical cancer. Mock SA will be conducted in the same pattern as university exams one month before the final exams.
3. Teaching skills: Candidates are encouraged to teach undergraduate medical students and paramedical students, if any. In addition, the second year student acts as a mentor for the immediate junior in all aspects of the course.
4. Pedagogy as a tool in formative assessment helps the student to be a better teacher.

Scheme of Examination:

Scheme of Examinations

A) Theory

Name of the course	Course Code	Topics	Marks
Basic Sciences applied to Vascular Surgery	MCHC509A	Applied Anatomy, Pathology, Radiation Safety, General Principles of vascular surgery	100
Vascular Surgery	MCHC510A	Principles and Practice of open vascular surgery and its techniques	100
Vascular and Endovascular Surgery	MCHC511A	Principals of use of endovascular therapy and vascular therapy and management protocols in various conditions	100
Recent Advances in Vascular Surgery	MCHC512A	Recent Developments, trials and innovations in vascular and endovascular surgery	100

* Each paper will have 10 short notes and 2 essay type questions

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Part 1 (At the end of first eighteen months of study)

Paper 1 - 3 hrs, 9 short essay type questions on Applied Anatomy and Applied Physiology.

Paper 2 - 3 hrs, 9 short essay type questions on applied pathology and Microbiology and Vascular engineering.

Part 2 (At the end of 3 year and after passing Part 1)

Paper 1 – 3 hrs, Short essay type questions (20 mts) on clinical vascular and endo vascular surgery including venous systems

Paper 2 – 3 hrs, Short essay type questions (20 mts) on vascular surgery including recent advances and venous systems.

Clinical:

CASE	NO.OF CASES	DURATION	MARKS
Long Case	One	One Hour	100
Short Cases	Two	One Hour (30 minutes each)	100
Ward Rounds	Four	One Hour	100
Oral Viva	Four	One Hour	100
		Total	**400**

One long case 45 minutes
3 short cases 45 minutes

Practical:

Surgical Pathology
Operative Surgery
Vascuar Radiology
Viva Voce

} 60 to 90 Minutes

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Annexure

Annexure 1: Competency list and objectives
Annexure 2: Educational Objectives
Annexure 3: Sample of monthly schedules
Annexure 4: PG outside posting policy
Annexure 5: Logbook entry
Annexure 6: Students appraisal form
Annexure 7: Course Content

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Annexure 1: Competency list and objectives

COMPETENCY AND EDUCATIONAL OBJECTIVES FOR VASCULAR SURGERY

General:

Each of the categories in the Clinical Curriculum is assumed to include the diagnosis and management of theproblem for all etiologies to include atherosclerosis, trauma, infection, etc. where appropriate. A general understanding of each topic in the Clinical Curriculum is expected at the completion of vascular surgery training. In addition, the trainee is expected to know the natural history of the various diseases. Knowledge of additional/non-core topics will be encouraged but not required.

Educational objectives have also been developed for each section of the Clinical Curriculum. It is expected that these objectives will be achieved by each trainee at the completion of training. Included are selected references for each set of objectives that are suggested as minimal background reading for each section.

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Annexure 2: Educational Objectives

Educational Objectives

1. Diagnosis and Management of Aneurysmal Disease
2. Diagnosis and Management of Extremity Arterial Occlusive Disease
3. Diagnosis and Management of Renal Artery Occlusive Disease
4. Diagnosis and Management of Visceral Ischemia
5. Diagnosis and Management of Carotid Artery Occlusive Disease
6. Diagnosis and Management of Innominate, Subclavian and Vertebrobasilar Arterial Disease
7. Diagnosis and Management of Thoracic Outlet Syndrome
8. Diagnosis and Management of Acute Arterial Occlusion
9. Diagnosis and Management of Diabetic Foot Problems
10. Diagnosis and Management of Complications of Vascular Therapy
11. Diagnosis and Management of Vascular Trauma
12. Diagnosis and Management of Venous Thromboembolic Disease
13. Diagnosis and Management of Chronic Venous Insufficiency
14. Diagnosis and Management of Lymphedema
15. Indications and Techniques for Extremity Amputation
16. Techniques for the Diagnosis of Peripheral Vascular Disease
17. Use of Endovascular Therapy in the Management of Peripheral Vascular Disease
18. Risk Stratification in Patients with Peripheral Vascular Disease
19. Diagnosis and Management of Coagulation Disorders in Patients with Peripheral Vascular Disease
20. Diagnosis and Management of Miscellaneous Vasculogenic Problems
21. Diagnosis and Management of Non-Atherosclerotic Vascular Diseases
22. Diagnosis and Management of Arterial Venous Malformations
23. Indications for and Techniques of Vascular Access
24. Indications for and Results of Sympathectomy in Patients with Peripheral Vascular Disease
25. Diagnosis and Management of Portal Hypertension

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Annexure 3: Sample of monthly schedules

Annexure 3

APRIL TEACHING SCHEDULE FOR POST GRADUATES

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Seminar Chart rounds	Chart rounds	Chart rounds Journal club	Chart rounds	Chart rounds Case presentation	3 Grand rounds
4 Sunday	Seminar Chart rounds	Chart rounds	Chart rounds Journal club	8 Chart rounds	9 Case presentation	10 Grand rounds
11 Sunday	Seminar Chart rounds	13 Holiday	Chart rounds Journal club	15 Chart rounds	16 Case presentation	17 Grand rounds
18 Sunday	Seminar Chart rounds	Chart rounds	Chart rounds Journal club	22 Chart rounds	23 Case presentation	24 Grand rounds
25 Sunday	Seminar Chart rounds	Chart rounds	28 Faculty lecture	29 FA	30 Case presentation	

Instructions: -

- All classes will be based on discussion
- PPTS to be used only to show images /staging /RT planning details
- Both students should discuss with each other prior to the class and present
- The team shall discuss with the teacher atleast 3-5days before the date of the class.
- The week's doubts clarifications to be discussed with the faculty on Saturdays.

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ANNEXURE – 4

POLICY FOR OUTSIDE PG POSTINGS

Year wise PG Posting

1. 2[st] year students are posted for 2 weeks each in the Departments of Radiology and Cardiac surgery .
2. 3[nd] year students are posted for 2 month each in the External institution for training.

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Annexure 5

Logbook entry

Date	
Setting/method	
Presented/attended	
Summary in brief	
Reflection	
Teachers comments	

Student's signature

Guide's Signature

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ANNEXURE-6

Postgraduate Students Appraisal Form Name of the PG Student Period of Training Duration:.....to.....

Sl. No	Particulars	Not satisfactory (1,2,3)	Satisfactory (4,5,6)	More than Satisfactory (7,8,9,10)	Remarks
1	Journal based learning				
2	Patient care and rounds				
3.	Bedside teaching, Clinical seminars				
4.	Communication skills				
5.	Log book				
6.	Thesis work				
7.	CME/Outreach programmes/Conference presentations				
8.	Self-directed learning				
9.	Under-graduate teaching				
10.	Research/Publication				

Sign of the student Sign of the assessor Sign of Head of the Department

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Annexure 7 : Course Content for Vascular Surgery

1. **Aneurysmal Disease**

I. Basic Science

1. To describe aortic architecture and functions.
2. To describe hemodynamic changes at major bifurcation and Laplace's Law.
3. To describe the role of aging and atherosclerosis in aortic enlargement.
4. To describe the role of inflammation and proteases in aneurysm formation.
5. To describe the differences in Marfan's disease and Ehlers Danlos syndrome.

II. Diagnostic Evaluation

1. To understand the incidence and prevalence of aneurysmal disease according to age.
2. To understand the natural history of abdominal aortic aneurysms.
3. To understand the genetic distribution of the disease.
4. To understand the roles of ultrasound, angiography, CT and MRI/MRA in screening and in planning surgery.

III. Treatment

1. To understand the indications for surgical repair and the factors which contribute to surgical decision making.
2. To understand the technical aspects of aortic aneurysm repair and surgical options and alternatives.
3. To describe the surgical management of complex aortic aneurysms (including horseshoe kidneys, aortocaval and aorto duodenal fistulae, mycotic, inflammatory).
4. To have knowledge of both the immediate and long-term outcomes of surgery for aortic aneurysmal disease (including symptomatic, asymptomatic, thoracoabdominal, juxtarenal, infrarenal and recurrent).
5. To describe the management and prevention of surgical complications including spinal cord ischemia, distal embolization, myocardial infarction, graft infection.

2. Peripheral Vascular Occlusive Disease

I. Anatomy & Pathophysiology

1. To define the normal arterial anatomy of the peripheral vascular system including commonly encountered anatomic variations.
2. To recognize the physiologic and pathophysiologic collateral circulatory routes which commonly develop in response to occlusive disease.
3. To understand the neural, humoral, and pharmacologic mechanisms which affect peripheral vascular reactivity and auto-regulatory function.
4. To appreciate the multiple etiologies of acute peripheral vascular ischemia including embolism,
thrombosis, dissection, venous occlusion, trauma.
5. To appreciate the multiple etiologies of chronic peripheral vascular ischemia including atherosclerosis, aneurysm, entrapment syndromes, trauma, and a variety of non-atherosclerotic occlusive entities.
6. To understand the mechanism of early and late graft failure, fibro-intimal hyperplasia and progression of disease.

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II. Diagnostic Evalutation

Acute Peripheral Ischemia

1. To understand the signs and symptoms characteristic of acute arterial ischemia and the differential diagnosis.
2. To understand the importance of assessing the degree of acute ischemia.
3. To appreciate the significance of the duration of acute ischemia.
4. To recognize the importance of antecedent clinical entities which may predispose to acute peripheral ischemia including atrial fibrillation, prior myocardial infarction, aortic dissection and hypercoagulopathies.
5. To appreciate the significance of initial electrolyte, acid base and other laboratory parameters useful in assessing the magnitude of ischemia to define the indications for appropriate therapy.
6. To understand the relative indications for immediate diagnostic angiography versus urgent surgical exploration.
7. To understand the arteriographic findings characteristic of different etiologies and to appreciate the diagnostic imaging options available in addition to arteriography (MRA, CT, duplex imaging).

Chronic Peripheral Vascular Ischemia

1. To understand the characteristic signs and symptoms of chronic peripheral vascular ischemia relative to the patient's history and physical examination.
2. To understand the importance of appropriate imaging studies prior to formulating a therapeutic
management plan.
3. To understand the importance of hemodynamic testing in the formulation of a therapeutic management plan.
4. To appreciate the characteristic angiographic findings in patients with common patterns of peripheral vascular occlusion as well as the importance of assessing available collaterals.

III. Treatment

Acute Peripheral Vascular Ischemia

1. To appreciate the relative indications for immediate angiography, thrombolytic therapy, or urgent surgicalexploration relative to the duration of symptoms and magnitude of ischemia.
2. To have a comprehensive understanding of the variety of surgical exposures of the peripheral vasculature.
3. To understand the relative indications for the major surgical options available for peripheral occlusive disease including endarterectomy, patch angioplasty and bypass graft (autogenous versus prosthetic).
4. To understand the role of intra-operative thrombolytic agents, dosage and mechanisms of action.
5. To appreciate the sequela of reperfusion following acute ischemia in terms of systemic effects as well as local effects warranting fasciotomy including the anatomy and physiology of fasciotomy.
6. To be familiar with endovascular options for the treatment of occlusive disease including atherectomy, laser, balloon angioplasty, stent graft, as well as the role of angioscopy.
7. To understand the importance of completion imaging studies following peripheral arterial reconstruction.

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Chronic Peripheral Vascular Ischemia

1. To have a comprehensive understanding of all standard surgical approaches for surgical revascularization including endarterectomy, patch angioplasty and bypass (in -situ and reversed vein grafts, prosthetic grafts).
2. To understand the difference in application of options relative to the degree of ischemia (claudication versus critical ischemia, with or without tissue necrosis).
3. To understand indications for primary amputation.
4. To have an understanding of the role of endovascular approaches including laser, atherectomy,
thrombectomy, balloon dilatation with or without stent, and angioscopy.
5. To have a comprehensive knowledge of popliteal entrapment and advential cystic disease and their treatment.
6. To understand the necessity for post revascularization non-invasive hemodynamic assessment and criteria for reintervention for a failing of failed bypass.

3. Renal Artery Disease

I. Anatomy and Pathophysiology

1. To define normal renal artery anatomy and collateral pathways important in renal artery disease.
2. To understand the etiology, pathology and natural history of these renal artery lesions:
    a. Renal artery atherosclerosis
    b. Renal artery fibromuscular dysplasia
    c. Renal artery aneurysm
    d. Renal arteriovenous malformation
    e. Takayasu's arteritis
    f. Middle aortic syndrome/congenital hypoplasia
    g. Atheroembolic disease
    h. Renal artery trauma
    i. Embolic occlusion
    j. Renal artery dissection
3. To define common co-existing extrarenal diseases associated with the various renal artery lesions.
4. To understand the exocrine and endocrine function of the kidney, and relate these to the structure and function of the nephron unit.
5. To understand the renin-angiotensin axis in the absence and presence of renal artery disease.
6. To describe the mechanisms of renovascular hypertension and renovascular insufficiency (i.e., ischemic nephropathy) and to understand how these differ for unilateral and bilateral renal artery disease.

II. Diagnostic Evaluation

Screening and Imaging

1. To describe the clinical features of renovascular hypertension and renovascular insufficiency, and to contrast these with essential hypertension and parenchymal renal failure.
2. To describe the performance and diagnostic criteria for these screening/imaging studies:
    a. Captopril renin test
    b. Captopril renography
    c. Intravenous urography
    d. Ultrasonography
        1. Duplex sonography

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2. Intravascular sonography
e. Spiral computerized tomography
f. Magnetic resonance imaging
g. Angiography
1. Digital subtraction angiography
a. Intravenous
b. Intra-arterial
2. Cut-film angiography
3. CO2 angiography

3. To define the applications and limitations of available screening/imaging studies.

Tests of Functional Significance

1. To distinguish between functionally significant and clinically silent renal artery disease.
2. To define the selection and patient preparation for these studies of functional significance:
a. Split renal function test
b. Selective renal vein renin determination
c. Peripheral plasma renin determination
d. Captopril renin test
e. Captopril renography
3. To describe the diagnostic criteria, predictive value and limitations of each study of physiologic significance.

III. Treatment

1. To describe the strategies, options and anticipated results of medical management for the various renal artery lesions.
2. To appreciate the limitations and complications associated with medical management of renovascular hypertension and renovascular insufficiency.
3. To understand the indications, anticipated anatomic results and clinical response associated with catheterbased intervention for the various renal artery lesions:
a. PTA ± intravascular stenting
b. Athrectomy
c. Fibrinolytic therapy
4. To understand the indications for surgical renal artery reconstruction as they relate to the various renal artery lesions.
5. To define the techniques of surgical exposure for renal artery lesions.
6. To understand the selection and performance of direct and indirect reconstruction for the different renal artery lesions:
a. Direct reconstruction
1. Aortorenal bypass
2. Endarterectomy
a. Transaortic
b. Transrenal
3. Reimplantation
4. Ex vivo reconstruction
b. Indirect reconstruction
1. Splanchnorenal bypass
a. Splenorenal
b. Hepatorenal
c. Nephrectomy

7. To describe the anticipated results of reconstruction and nephrectomy as they relate to hypertension response, renal function response, subsequent cardiovascular events and patient survival.
8. To define the management of silent and functionally significant renal artery lesions combined with occlusive or aneurysmal aortic disease.
9. To recognize and develop a plan of management for complications associated with surgical management of renal artery disease and understand how these complications relate to co-existing renal and extrarenal disease.

4. Visceral Ischemia

I. Anatomy and Pathophysiology

1. To define the normal arterial and venous anatomy of the mesenteric circulation and to be familiar with the more frequently encountered anatomic variations.
2. To recognize the physiologic and pathophysiologic collateral circulation to the gastrointestinal tract that may develop in response to occlusive disease of the main mesenteric vessels.
3. To understand the high flow, low resistance physiology of normal mesenteric blood flow, recognize the neural, humoral (hormonal) and enteric (intraluminal) mechanisms of autoregulation, and understand the high degree of vasoreactivity of this arterial bed.
4. To understand the multiple etiologies of acute mesenteric ischemia including embolism, thrombosis, dissection, venous occlusion, trauma, and gut ischemia following aortic reconstruction
5. To understand the multiple possible etiologies of syndromes of chronic mesenteric ischemia including atherosclerosis, aneurysm, extrinsic compression syndromes, and other nonatherosclerotic arteriopathies.
6. To understand the clinical correllation of multiple visceral vessel involvement with the development of symptoms of chronic intestinal ischemia based upon an understanding of the compensatory collateral perfusion of the gut.

II. Diagnostic Evaluation

Acute Mesenteric Ischemia

1. To understand the characteristic initial signs and symptoms suggestive of acute mesenteric ischemia and how symptoms and physical findings may differ from other causes of the acute abdomen.
2. To define preexistent clinical conditions that may predispose to, or support the clinical diagnosis of acute mesenteric ischemia, e.g. atrial fibrillation, previous myocardial infarction (mesenteric embolism), severe cardiopulmonary dysfunction (non-occlusive ischemia), history of post-prandial pain and weight loss, known aortic dissection (mesenteric thrombosis), hypercoaguable states (mesenteric venous thrombosis).
3. To understand the parameters of initial serologic testing that characterize or may support the clinical diagnosis of acute mesenteric ischemia.
4. To define the indications for mesenteric arteriography (or other forms of visceral arterial imaging) in patients with suspected acute mesenteric ischemia and understand the technical aspects of the conduct of arteriography necessary to make an accurate diagnosis.
5. To define the characteristic arteriographic findings diagnostic of the major causes of acute mesenteric arterial ischemia, mesenteric thrombosis, mesenteric embolism, and non-occlusive mesenteric ischemia.
6. To define the appropriate diagnostic evaluation for suspected intestinal ischemia following aortic surgery.

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7. To understand the usefulness of alternative imaging techniques (CT, MRI) for the diagnosis of acute mesenteric venous thrombosis.

Chronic Mesenteric Ischemia

1. To understand the characteristic signs and symptoms of chronic mesenteric ischemia and how other aspects of patients' history (e.g. previous aortic surgery) or physical examination (e.g. aortoiliac occlusive disease) may suggest the presence of associated visceral arterial occlusive disease.
2. To understand the limitations of standard gastrointestinal diagnostic testing modalities (e.g. GI endoscopy, contrast studies, CT, etc.) for diagnosis of chronic mesenteric ischemia.

3. To understand the usefulness of porto-mesenteric duplex ultrasound scanning for elective noninvasive evaluation of the major visceral vessels.
4. To define the indications for arteriography (or alternative vascular imaging studies) in patients with suspected chronic mesenteric ischemia and understand the arteriographic findings that are considered diagnostic of this condition.
5. To recognize the characteristic arteriographic findings in atypical causes of mesenteric arterial compromise including extrinsic compression and nonatherosclerotic visceral arterial disease.

III. Treatment

Acute Mesenteric Ischemia

1. To be familiar with techniques for surgical exposure of the main mesenteric vessels, to understand standard surgical options for revascularization following acute mesenteric embolism or acute mesenteric arterial thrombisis, and to understand surgical options for the management of intestinal necrosis when this has occurred.
2. To recognize the relationship of different anatomic patterns of gut infarction to the different causes of acute mesenteric ischemia when intestinal infarction is encountered unexpectedly at the time of laparotomy.
3. To understand the critical relationships between the extent of viable bowel (before and/or after successful revascularization) and the extent of resection of nonviable intestine, and the impact of these observations upon both the short and long-term prognosis for the patient.
4. To understand the relative usefullness of intraoperative techniques available for the assessment of intestinal viability at the time of surgical treatment for acute mesentertic ischemia.
5. To understand the pathophysiologic effects of intestinal reperfusion after surgical treatment of acute mesenteric ischemia and the impact of these effects on postoperative patient care.
6. To understand the role of early empiric re-exploration following surgical treatment of acute mesenteric ischemia.
7. To understand standard and alternative treatments for mesenteric venous thrombosis including the role of surgical treatment in the management of this disorder.
8. To understand the management of suspected acute gut ischemia occurring after aortic surgery.
9. To understand the therapeutic role of interventional non-surgical treatments in the management of all forms acute mesenteric ischemia, particularly in non-occlusive mesenteric ischemia.

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Chronic Mesenteric Ischemia

1. To be familiar with all standard surgical techniques for direct, elective visceral revascularization and understand the importance of comprehensive revascularization in the surgical treatment of chronic intestinal ischemia.
2. To be aware of surgical alternatives for treatment of atypical or non-atherosclerotic visceral arterial occlusive lesions.
3. To understand the possible application of interventional, nonsurgical treatments for chronic visceral arterial occlusive lesions.
4. To understand the usefulness of noninvasive vascular testing for the follow-up of patients having visceral revascularization procedures.

5. Carotid Artery Disease

I. Anatomy and Pathophysiology

1. To describe the anatomy of the arch, great vessels, and intracranial arteries.
2. To describe the embryology of the above and relate the common anomalies to the embryology.
3. Discuss the collateral arterial communications of the extracranial and intracranial arteries.
4. To discuss the diagnosis of anomalies and collateral circulation utilizing diagnostic modalities including CT scan, MRI, SPECT, and transcranial doppler.
5. To understand the different etiologies of carotid artery disease.
    a. Atherosclerosis
        i. Define the systemic risk factors for atherosclerosis.
        ii. Define the systemic effects of atherosclerosis and how these effects impact the diagnosis and treatment of the patient with carotid stenosis.
    b. Kinking and tortuosity
    c. Fibromuscular dysplasia
    d. Compression
    e. Traumatic occlusion
    f. Acute Dissection
    g. Inflammatory arteriopathies
6. To describe the gross pathologic and histologic characteristics of each etiology above.
7. To discuss how each etiology produces cerebral events in terms of occlusion and/or embolism.
8. To discuss the normal flow patterns at the carotid bifurcation, and how they are affected by the atherosclerotic process.

II. Diagnostic Evaluation

History and Physical Examination

1. To define hemispheric, non-hemispheric, and non-specific symptoms.
2. To differentiate among transient ischemic attack (TIA), reversible ischemic neurologic deficit (RIND), stroke in evolution and completed stroke.
3. To describe the arterial and neurologic examination and their importance in caring for patients with carotid artery disease.
4. To describe the relationship between carotid artery atherosclerosis and the clinical syndrome of vertibrobasilar insufficiency.

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5. To describe and defend the appropriate evaluation for patients with each of the above clinical presentations.

Carotid Duplex Examination

1. To be able to explain the principles of doppler ultrasound.
2. To describe the normal doppler signals in the internal, external, and common carotid arteries.
3. To discuss the sensitivity and specificity of duplex scanning in detecting carotid artery stenosis.
4. To discuss the risks and benefits of relying on duplex ultrasound and eliminating angiography.
5. To understand the basics of P.V. Lab Accreditation.

Angiography and MRA

1. Angiography: to be able to discuss the technique, its limitations and complications.
2. MRA: to be able to discuss the technique. limitations and complications.
3. To discuss and compare the different methods of measuring stenosis.

Diagnostic Brain Scanning

1. For each of the following modalities, explain the principles, indications, complications, and its influenceupon the indications for carotid endarterectomy.
    a. CT scan
    b. MRI
    c. SPECT
    d. Transcranial doppler

III. Treatment

Treatment of Neurologic Syndromes in Patients with Carotid Stenosis

1. To discuss the non-surgical and surgical treatment of acute ischemic syndromes including stroke.
2. To discuss the role of thrombolytic therapy in the treatment of stroke syndrome.
3. To be able to construct a diagnostic and treatment algorithm for various stroke syndromes.
4. To be able to discuss the potential role of endovascular treatment.

Surgical Treatment

1. To discuss the intrathoracic and extrathoracic treatment of atherosclerotic stenosis or occlusion of the great vessels.
2. To describe the standard approach to carotid endarterectomy including intraoperative shunting, patching, anesthetic techniques, tacking sutures and methods of completion evaluation.
3. To describe the surgical treatment of fibromuscular dysplasia, kinking, radiation arteritis, tumors involving the carotid artery, other arteritides, and recurrent carotid stenosis.
4. To recognize the ca

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Course Specification

M.Ch Vascular Surgery 2022 onwards

Course Code: MCHC509A

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Course Specifications

Course Title	**Basic Sciences applied to Vascular Surgery**
Course Code	**M.CHC509A**
Department	**Vascular and endovascular surgery**
Faculty	**Ramaiah Medical college**

Course summary:
This course is designed in such a way that the student will master the basics vascular surgery the anatomy and pathophysiology of vascular diseases and clinical evaluation.

Course Outcomes:
CO 1: Demonstrate comprehensive knowledge of applied anatomy, classification of vascular disease. (C)

CO 2: Demonstrate the understanding of various concepts of clinical evaluation and role of appropriate investigations in planning. (C)

CO 3: Demonstrate the understanding of radiation safety and basic vascular exposures. (C)

Course content: As per annexure 7

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes					Program Specific Outcomes							
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
MCHC509A Basic Sciences applied to Vascular Surgery	CO 1	3	1	1	3	1	2	1	1	3	2	3	1	1
	CO 2	2	2	1	3	2	1	1	1	3	2	3	1	1
	CO 3	1	2	2	3	1	2	1	2	2	2	3	1	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution														

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Course Specification

M.Ch Vascular Surgery 2022 onwards

Course Code: MCHC510A

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Course Specifications

Course Title	**Vascular Surgery**
Course Code	**MCHC510A**
Department	**Vascular Surgery**
Faculty	**Ramaiah Medical College**

Course summary:
This course is designed in such a way that the student will master the basics vascular surgery the anatomy and pathophysiology of vascular diseases and clinical evaluation.

Course Outcomes:
CO 1: Demonstrate comprehensive knowledge of surgical steps and techniques for vascular conditions and the physiological and scientific basis of treatment. (C)

CO 2: Demonstrate the understanding of various concepts of various open surgical techniques used in pathology. (C)

CO 3: Demonstrate the comprehensive understanding of preoperative optimization, complications of surgical procedure and methods of post operative management . (C)

Course content: As per annexure 7

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes					Program Specific Outcomes							
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
MCHC510A Vascular Surgery	CO 1	3	2	1	3	2	2	2	2	3	2	3	1	2
	CO 2	2	2	2	3	2	2	3	1	3	2	3	1	1
	CO 3	2	1	2	3	1	3	3	2	3	2	3	1	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution														

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Course Specification

M.Ch Vascular Surgery 2022 onwards

Course Code: MCHC511A

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Course Specifications

Course Title	**Vascular and Endovascular Surgery**
Course Code	**MCHC511A**
Department	**Vascular and endovascular surgery**
Faculty	**Ramaiah Medical College**

Course summary:
This course is designed in such a way that the student will master the basics vascular surgery the anatomy and pathophysiology of vascular diseases and clinical evaluation.

Course Outcomes:
CO 1: Demonstrate comprehensive knowledge of surgical steps and techniques and use of endovascular techniques. (C)

CO 2: Demonstrate the understanding of various devices used in endovascular therapy and various clinical trials In its use. (C)

CO 3: Demonstrate the comprehensive understanding of complications with usage in endovascular therapy. (C)

Course content: **As per annexure 7**

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes					Program Specific Outcomes							
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
MCHCS11A Vascular and Endovascular Surgery	CO 1	3	3	3	3	2	2	2	2	3	1	3	3	2
	CO 2	2	2	3	3	2	2	1	1	3	2	3	2	2
	CO 3	2	2	1	3	2	2	3	2	2	2	3	3	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution														

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Course Specification

M.Ch Vascular Surgery 2022 onwards

Course Code: MCHC512A

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Course Specifications

Course Title	**Recent advances in Vascular Surgery**
Course Code	**MCHC512A**
Department	**Vascular and endovascular surgery**
Faculty	**Ramaiah Medical College**

Course summary:
This course is designed in such a way that the student will master the basics vascular surgery the anatomy and pathophysiology of vascular diseases and clinical evaluation.

Course Outcomes:
CO 1: Demonstrate comprehensive knowledge of surgical usage and recent trials in vascular surgery. (C)

CO 2: Demonstrate the understanding of newer innovations and devices in the field of vascular and endovascular surgery. (C)

CO 3: Demonstrate the comprehensive understanding of newer modalities in the management of vascular diseases . (C)

Course content: **As per annexure 7**

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes					Program Specific Outcomes							
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
MCHC512A Recent advances in Vascular Surgery	CO 1	3	1	2	3	1	2	2	3	3	2	3	3	2
	CO 2	2	2	3	3	2	2	2	1	3	3	3	2	2
	CO 3	2	1	2	3	3	3	2	2	3	2	3	2	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution														

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COURSE MATERIALS

Recommended reading

1. Text book of Vascular Surgery – By Robert B. Rutherford.
2. Text book of Vascular Surgery – By Henry Haimovici
3. Moore, Wesley S.Vascular and Endovascular Surgery: A Comprehensive Review. 7th edn. Philadelphia. Saunders Elsevier. 2006.
4. Text book of Vascular Surgical Emergencies – John J. Bergen & James S. I. Yao.
5. Investigation of Vascular Diseases – By Andrew N. Nicolaides & James Yao.
6. Rob & Smith Operative Surgery Text book of Vascular Surgery – James Deeweese.
7. Comprehensive Vascular Exposures – By Ronald J. Sloney & David J. Effeney
8. Wylie's Atlas of Vascular Surgery& Organ Transplantation – Wayne Flye
9. Atlas of Vascular Surgery – Rutherford
10. CVS & Vascular diseases of the Aorta

Journals

1. Journal of Vascular surgery
2. European Journal of vascular and endovascular surgery
3. Annals of vascular surgery
4. Indian journal of Vascular and endovascular surgery

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