INCIDENCE OF CONTRAST INDUCED NEPHROPATHY AND LONG TERM OUTCOME OF RENAL FUNCTION AFTER PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY FOR SYMPTOMATIC PERIPHERAL ARTERIAL DISEASE

By

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M.B.B.S, DNB (GEN SURG)

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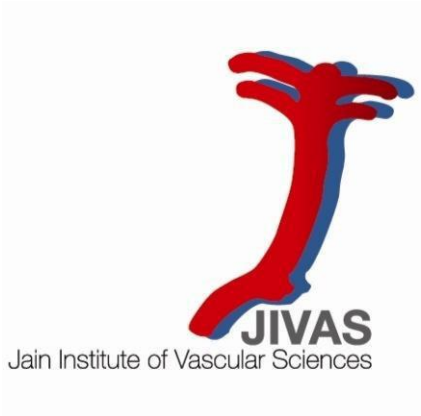

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I Dr Vishal V Hudgi hereby declare that this thesis entitled “Incidence of contrast induced nephropathy and long term outcome of renal function after percutaneous transluminal angioplasty for symptomatic peripheral arterial disease” is ‘bonafide’ in nature and was carried out by me for under the guidance and supervision of my guide Dr Vishnu M.

The interpretations put forth are based on my reading and understanding of the original texts and they are not published anywhere in the form of books, monographs or articles. The other books, articles and websites, which I have made use of are acknowledged at the respective place in the text.

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I hereby declare that this dissertation titled " INCIDENCE OF CONTRAST INDUCED NEPHROPATHY AND LONG TERM OUTCOME OF RENAL FUNCTION AFTER PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY FOR SYMPTOMATIC PERIPHERAL ARTERIAL DISEASE " is a bonafede and genuine research work carried out by me under the guidance and supervision of Dr. Vishnu M**,** Vascular surgeon, Jain Institute of Vascular Sciences (JIVAS), Bhagwan Mahaveer Jain Hospital, Bengaluru, in partial fulfilment of the requirement of National Board of Examinations regulation for the award of the Degree of DNB in Peripheral Vascular Surgery.

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Place: Bengaluru

Date: ***Dr. Vishal V Hudgi***

LIST OF ABBREVATIONS:

CLI	Critical Limb Ischemia
CIN	Contrast Induced Nephropathy
CKD	Chronic Kidney Disease
CIAKI	Contrast Induced Acute Kidney Injury
DM	Diabetes Mellitus
HTN	Hypertension
NAC	N- Acetyl cysteine
CVD	Cerebro Vascular Disease
ABI	Ankle Brachial Index
TBI	Toe Brachial Index
PVR	Pulse Volume Recording
TcPO2	Transcutaneous Oximetry
TOF	Time of Flight
MDRD	Modification of diet in renal disease
MAC	Monitored Anaesthesia Care
WIFI	Wound, Ischemia, Foot Infection
ESRD	End Stage Renal Disease
GFR	Glomerular Filtration Rate
CO2	Carbon dioxide
MACE	Major Adverse Cardiac Events
CVA	Cerebrovascular Accident (Stroke)

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INTRODUCTION:

It has been more than sixty years since contrast induced nephropathy (CIN) was first described in the medical literature. Variety of studies have been conducted to investigate its incidence and various mechanisms examined to explain its pathophysiology. However, CIN remains a controversial topic with a widely variable and often questionable incidence derived from various studies.

The contrast agents are used extensively in vascular imaging and interventions and are essential part of most radiological investigations like angiography, computed tomography (CT), magnetic resonance imaging (MRI). Nephrotoxicity leading to acute kidney injury is a well-known side effect of contrast agents which was described for first time in 1960[1].

Contrast induced nephropathy (CIN) is defined as an absolute increase of 0.5 mg/dL in serum creatinine concentration or a relative increase in 25% from the baseline value, as measured 48 to 72 hours after exposure to contrast medium [2,3]. CIN characteristically manifests 3 days after administration of the contrast medium, with a peak in renal function decline 3-5 days after contrast exposure[4]. Besides surgery and hypotension, administration of radiocontrast is the third most common cause of acute kidney injury[5].

The prevalence of CIN reported in literature varies between 1 to 45% and depends largely on co-morbidities of the study population. Furthermore, the estimated mortality among patients who develop this complication can be as high as 35% and renal function may fail to return to normal in 30% of survivors. In the current era, many protocols are being followed to reduce the incidence by pre procedure interventions.

Though there is extensive literature on CIN in coronary angiograms and CT scans, there is limited data on CIN in peripheral vascular surgery. An increase in use of invasive catheter-based diagnostic and therapeutic interventions has led to rise in the amount of intra-arterial contrast medium administered to patients. Although endovascular interventions are well established as limb salvage treatments for critical limb ischemia (CLI), few studies have analyzed the incidence of CIN in this group of patient population. The prompt identification of the conditions associated with CIN is important because contrast nephrotoxicity is the third most common cause of acute kidney injury in patients admitted to hospital[6].

Critical limb ischemia (CLI), defined as more than 2 weeks of rest pain, ulcers, or tissue loss attributed to arterial occlusive disease, is associated with great loss of both limb and life[7]. CLI is the most severe form of peripheral arterial disease and represents approximately 1% of total number of patients with PAD[8]. Most number of patients with PAD are asymptomatic; however, patients with intermittent claudication usually experience a limb loss rate of <5% over 5 years. Patients with critical limb ischemia (CLI) have a 1-year mortality and major amputation rates of 25% and 25%, respectively[7].

Through this study, we assessed the incidence of CIN after endovascular intervention in peripheral arterial diseases in a tertiary care hospital, which follows routine screening of all the risk factors for CIN and protocol-based interventions for its prevention. We also assessed the effect of CIN on long term morbidity and mortality.

REVIEW OF LITERATURE

The contrast media (CM) are used to improve the diagnostic accuracy in X-ray based radiological investigations. A class of chemical compounds containing benzoic acid derivative, sodium acetrizoate was synthesised in 1953 by Vernon Wallingford, a chemist from USA, which began the modern era of contrast media. These compounds were ionic and high-osmolar and were dominant till 1980. Since then, a lot of research in this area has led to modifications of the contrast agents to discover less toxic contrast agents. Torsten Almen, a Swedish radiologist found out that high osmolarity as the cause for pain and developed a chemical process to reduce osmolarity. This led to synthesis of non-ionic, low-osmolar contrast agent called metrizamide in 1968. Further, this led to development of low-osmolar second generation contrast media with increased solubility like iohexol, iopromide, iomeprol, ioversol and iobitridol which were marketed in various countries after 1980. Meglumine-sodium ioxalate was developed simultaneously, which was an ionic dimeric compound in 1979. Further, iso-osmolar, non-ionic dimers were developed and introduced in 1994[9].

The basic structure of all contrast agents is constituted by benzene ring which is composed of 6 carbon atoms attached to hydrogen atom as shown in fig.1. In contrast media, three of these hydrogen atoms are replaced by iodine atoms making the ring triiodinated benzene ring. Monomer contrast media contain one triiodinated benzene ring whereas dimers contain two. The iodine atoms are attached at 2,4,6 position. The ionic and non-ionic contrast media are differentiated by attachment at first carbon atom. In ionic media, sodium or cation like meglumine is attached whereas in non-ionic media an amide group is attached. The side chain containing hydroxyl group are attached at 1,3 and 5 position and function to increase solubility[10].

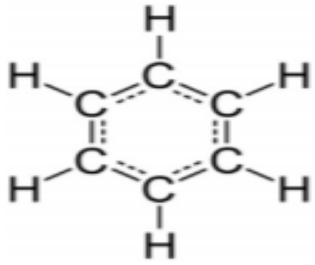


Fig.1 Benzene ring showing 6 carbon atoms attached to each other and hydrogen atoms[10].

Contrast agents are classified based on their solubility in water as ionic and non-ionic. They are further classified based on their osmolarity into 3 groups -- high-osmolar, low-osmolar and iso-osmolar. Ionic contrast agents are water soluble and they dissociate into positive and negative ions and combine with negative and positive ions of water respectively. The non-ionic contrast agents are also water soluble but they do not dissociate into ions, but are soluble due to their hydroxyl group[10]. Osmolality of CM is dependent on the number of particles of solute in solution and radio-opacity is dependent on the Iodine concentration of the solution.

Types of contrast agents[10]

- Ionic media
  - Monomers: high-osmolar (1000-2500mosm/kg H2O) contrast media
    Examples: ioxithalamic acids, diatrizoate
  - Dimers: low-osmolar (400-800mosm/ kg H2O) contrast media
    Example: ioxaglate
- Non-ionic media
  - Monomers: low-osmolar contrast media
    Examples: iohexol, iopamidol, ioversol, iopromide
  - Dimers: iso-osmolar (300mosm/kg H2O) contrast media
    Examples: iodixanol, iotrolan

The evidence obtained till now states that the physicochemical characteristics of currently available CM are not comparable. For example, nonionic, low-osmolal, monomeric agents appear to be less nephrotoxic than ionic, high-osmolal agents, at least in patients with preexisting renal impairment[11,12]. Some reviewers have hypothesized that nonionic, iso-osmolal dimers can offer some advantages when compared with nonionic, low-osmolar monomers, but there is limited evidence to support this hypothesis in the medical literature[13]. The results of the double-blind, multicentre Care study[14] showed no difference in the rate of CIN, defined as a >50% increase in serum creatinine level with respect to baseline, between patients with diabetic nephropathy who had received the low- osmolal contrast medium iopamidol and patients who had received the iso-osmolal contrast medium iodixanol.

The CM have short half-life by rapidly distributing intravascularly and extracellularly. The time taken for even distribution in body fluid ranges from 2 – 30 minutes[15]. They are not metabolised in the body and are excreted unchanged by kidney. In patients with normal renal function, 100% of CM are excreted within 24 hours. In renal dysfunction elimination half life is increased upto 40 hours or more[16].

Pathophysiology of CIN

Our understanding of CIN pathophysiology is still incomplete and is assumed based on animal and laboratory studies.

Risk factors for CIN

CIN is caused by multiple factors and pre existing renal impairment is an important factor in increasing the susceptibility to CIN[17]. The various risk factors for CIN are listed in table 1 & 2.

Table 1. The risk factors for CIN[18]

Patient related risk factors	Procedure related risk factors
Age	Multiple CM injection within 72 hours
Renal insufficiency	Intraarterial injection site
Diabetes mellitus	High volume of CM
Volume depletion	High osmolar CM
Hypotension	
Low cardiac output	
Class IV CHF	
Other nephrotoxins	
Renal transplant	
Hypoalbuminemia (less than 35g/l)	

Table 2. The risk factors can also be categorised as modifiable and nonmodifiable risk factors[19].

Nonmodifiable risk factors	Modifiable risk factors
Advanced age (>65 years)	Large doses and multiple injections of CM
Pre-existing impairment of renal function	Route of administration
Advanced congestive heart failure	Osmolality of contrast media
Diabetes mellitus	Severe dehydration
Multiple myeloma	Prolonged hypotension
Sepsis	Anaemia
Compromised left ventricle systolic performance	Reduction of effective intravascular volume
Renal transplant	Concomitant use of nephrotoxic drugs

Preexisting renal impairment particularly secondary to diabetic nephropathy, salt depletion and dehydration, congestive heart failure, age greater than 70 years, and concurrent use of nephrotoxic drugs are suggested by European Society of Urogenital Radiology as risk factors for CIN[20]. The CIN risk significantly increases in patients with chronic kidney disease (CKD)[21]. In a prospective study by Abe M, Morimoto T, Akao M, et al with a median follow up of 42 months, the rate of CIN was 11% in those with chronic kidney disease (CKD) and 2% in those without CKD[22].

Toprak et al. showed that CIAKI occurred in 20% of patients with CKD and diabetes and in 11.4% of patients with CKD and prediabetes (defined as having a fasting glucose level of 5.55–6.94 mmol/l), versus 5.5% of patients with CKD but no evidence of diabetes or prediabetes[23].

Some studies show Diabetes mellitus with existing kidney disease increases the risk of CIN, incidence ranging from 5.7 to 29.4%[24]. Diabetic nephropathy is characterized by renal vascular dysfunction, with increased sensitivity to renal vasoconstrictors and renal ischemia, and a decrease in nitric oxide-dependent vasodilation. The higher susceptibility of diabetics can be explained by increased endothelin converting enzyme leading to increased levels of endothelin[25] and due to hypersensitivity of renal vessels in diabetics to adenosine[26]. Hypercholesterolemia in diabetics also poses greatest risk for CIN[27].

Concomitant use of other nephrotoxic agents pose risk by inhibiting action of vasodilatory mediators[28,29]. Decreased intravascular volume leads to sodium depletion which

accentuates the vasoconstriction action of adenosine[30]. Advanced age is a risk due to age related decrease in renal function, co existent cardiac diseases and presence of old vessels[21]. The increased volume of contrast leads to increased concentration in glomeruli, increasing the risk of CIN[31.32]. Intra-arterial administration of CM is found to be riskier than intra-venous administration due to acute increase in intrarenal concentration of CM, especially if site of injection is suprarenal[6,34,35]. LOCM have been found to more beneficial over HOCM with respect to CIN but a recent meta-analysis has shown no difference between LOCM and IOCM[36]. Along with low eGFR, low hematocrit has shown to have increased risk of CIN compared to high hematocrit[7,35,36,37].

Pathogenesis:

It is postulated that CIN is caused by combination of hypoxic injury to kidneys, direct cellular toxicity, reactive oxygen species injury and rheological properties of CM[9,38,39].

- Hypoxic injury to kidney

Haemodynamic changes: The most vulnerable part of kidney to hypoxia is the ascending loop of Henle due to its high metabolic activity[36]. The renal medulla has high oxygen consumption due to active reabsorption of sodium. But physiologically it has low paO2 due to its distance from distal vasa recta which supplies blood to outer medulla. After injection of CM a transient increase in renal blood flow is seen followed by decrease in renal blood flow for several hours[37,38,39]. The CM increases transiently GFR, urine output and osmolarity after injection[9]. The medullary oxygen consumption increases due to increased osmolarity of urine and endothelin release leading to more sodium reabsorption[37,39,40]. But there is decrease in medullary blood flow due to vasoconstriction of afferent arterioles by CM as DVR supplying medulla arise from cortical arterioles which plays an important role in CIN[40].

Neurohumoral changes: An imbalance between vasodilators and vasoconstrictors is seen post CM administration leading to alteration in regional microcirculation. Vasodilators like adenosine, dopamine, nitric oxide (NO), atrial natriuretic peptide (ANP), prostaglandin A2 act on the medulla to increase blood supply[36,41,42]. Vasoconstrictors include vasopressin, angiotensin II, endothelin[36,39]. Other mediators like serotonin, leukotrienes, bradykinin also act on both vasoconstrictive and vasodilative physiology[43]. The extent of role of each mediator in CIN is unknown. Sendesky et al in their experiment showed that after injection of Iodixanol,

the DVR diameter decreased by 48%. This was mediated by decreased NO synthesis and increased angiotensin II reactivity[44].

The hypoxic damage in CIN is thought to be a combination of increased oxygen demand and changes in microcirculation leading to imbalance of demand and supply.

- Reactive oxygen species

The less aggressive acting free radicals like H2O2 are called reactive oxygen species (ROS)[38,42]. Free radicals are the atoms or molecules which have one or more unpaired electrons[40]. The ROS play an important role under physiological condition in renal medulla to control regional microcirculation and tubular transport. After CM injection, ROS increase due to medullary hypoxia and oxidative stress[45]. Once they increase beyond cellular scavenging capacity, ROS cause ischemic reperfusion injury to tubular cells. ROS play an important role in altering regional microcirculation in CIN by increasing AT II and endothelin I mediated vasoconstriction[45].

- Contrast media properties

The CM are known to cause direct cellular toxicity by inducing apoptosis. High -osmolar CM are known to increase CIN risk than low-osmolar CM[46]. Contrast media get concentrated in tubular cells and high viscous CM remain in contact with tubular cells for longer time[34]. They are known to cause damage by inducing ROS, disrupting intercellular connections, mitochondrial disruption, DNA damage and causing apoptosis[46].

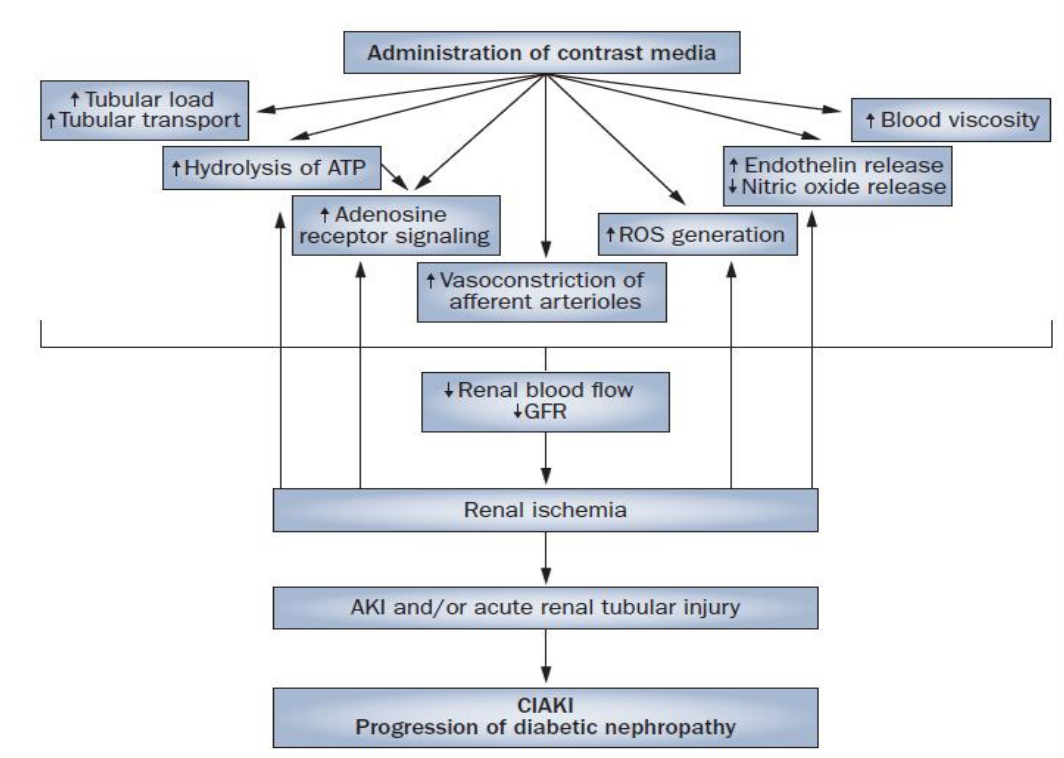


FIG 2: The pathways potentially underlying the pathogenesis of CIAKI in patients with diabetes.

Clinical features:

CIN is usually non oliguric and asymptomatic with a transient decrease in renal function. Serum creatinine rises within 24 hours post contrast procedure attaining a peak in 3- 5 days and usually returns to baseline in 10- 14 days. Rare situations are there where hemodialysis is needed for oliguric acute renal deterioration. This is manifested as oliguria (less than 400 ml of urine volume in 24 hours), within 24 hours of post contrast exposure and persists for 2 – 5 days. Mortality and morbidity are proportionately higher in these group of patients who had undergone hemodialysis when compared with the patients who have non oliguric renal failure.

Preventive measures and Guidelines for prevention of CIN:

Currently many preventive measures have been used which affect different pathogenetic mechanisms of CIN, but only few have shown real efficacy. The measures which failed to show any benefit in well-designed trials include dopamine, diuretics, atrial natriuretic peptide,

fenoldopam, endothelin receptor antagonists, and L-Arginine. The strategies with proven efficacy or possible value are discussed here:

1. Hydration: it has been stated that volume supplementation is the cornerstone for the prevention of CIN, being safe, effective, and inexpensive[47]. On a theoretical basis, hydration causes expansion of intravascular volume, thereby suppressing the renin angiotensin cascade and consequently reducing renal vasoconstriction and hypoperfusion; the result is an increase of diuresis, thereby limiting the duration of contrast material contact with renal tubules and therefore its toxicity on tubular epithelium[48,49]. A meta-analysis suggested that there is minimal difference in efficacy between oral and intravenous hydration[50]. Based on the premise that alkalinization of the urine may decrease the generation of free radicals that can harm the renal tubules, several studies have been performed to evaluate the use of isotonic bicarbonate rather than isotonic 0.9% saline as the hydration agent. High-risk patients should be administered 0.9% saline by IV infusion at a rate of approximately 1mL/kg per hour, beginning 6–12 hours before the procedure and continuing for up to 12–24 hours after the radiographic examination, if diuresis is appropriate and cardiovascular condition allows it[6].

   As per the KDIGO guidelines 2012 prevention strategies of CI-AKI recommendation for fluid administration is IV volume expansion with either isotonic sodium chloride or sodium bicarbonate solutions, rather than no IV volume expansion, in patients at increased risk for CI-AKI[50]. Prophylaxis with normal saline or sodium bicarbonate recommended for patients not undergoing dialysis with eGFR less than 45 mL/min/1.73 m^2; prophylaxis may include *N*-acetylcysteine. Prophylaxis is ambiguous for patients with eGFR of 45–59 mL/min/1.73m^2.

   The key finding from the PRESERVE Trial is that adequate volume expansion with isotonic saline alone remains a key element of best practice for intra-arterial contrast prophylaxis during elective procedures. There is no added benefit of bicarbonate or acetylcysteine over isotonic saline in patients undergoing angiogram with decreased e

   GFR/diabetes.

   A subgroup analysis of the PRESERVE (Prevention of Serious Adverse Effects Following Angiography) trial assessed IV sodium bicarbonate or IV sodium chloride and oral acetylcysteine or placebo for the prevention of CI-AKI and intermediate-term

adverse outcomes[51]. The outcome was among patients with CKD undergoing PCI, there was no benefit of IV sodium bicarbonate over IV sodium chloride or of acetylcysteine over placebo for the prevention of CI-AKI or intermediate-term adverse outcomes.

2. N-acetylcysteine (NAC): is probably the most widely studied pharmacological agent for the prevention of CIN. NAC is inexpensive, easy to administer and has a favourable safety profile, it also may have free radical scavenging and organ protective effects. As per the KDIGO guidelines 2012 it recommends using NAC, together with IV isotonic crystalloids, in patients at increased risk of CI-AKI[52]. The REMEDIAL (Renal Insufficiency Following Contrast Media Administration) trial showed that a combination of NAC and volume expansion with sodium bicarbonate was more effective than NAC alone[53]. In the largest and most methodologically rigorous trial, the Acetylcysteine for Contrast-Induced Nephropathy (ACT) Trial Investigators, have convincingly demonstrated a lack of efficacy for NAC in reducing the incidence of CIN, mortality or need for dialysis at 30 days, a finding that was observed in all subgroups analysed, including those with renal impairment[54]. Meta-analysis in 2016 showed an inverse and significant association between NAC supplementation and risk of CIN in patients undergoing coronary angiography and computed tomography, while a protective role for NAC in patients undergoing peripheral angiography was not obvious[55].

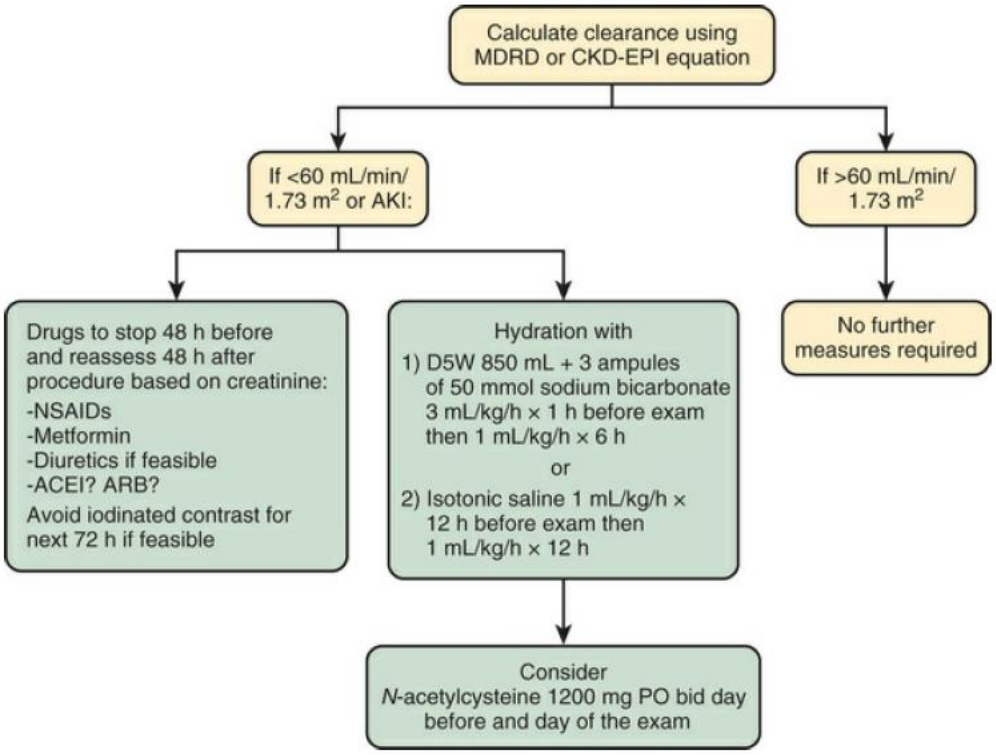


Fig 3: Management of patients receiving iodinated contrast media

Recommendation by Johnson RJ et al[56] proposed in 2015 for management of patients receiving iodinated contrast media shown in fig 3.

3. Discontinuation of nephrotoxic drugs: nephrotoxic medications, such as aminoglycosides, vancomycin, amphotericin B, metformin and nonsteroidal anti-inflammatory drugs, should be discontinued before contrast media administration[57].
4. Statins: The nephroprotective effect of statins against contrast media is mainly by its antioxidant, anti-inflammatory, antithrombotic properties and to its vasodilator properties mediated by NO, that improve renal microcirculation[58]. Patients with acute coronary syndrome undergoing percutaneous coronary intervention were given short-term pretreatment with high-dose atorvastatin load (atorvastatin 80 mg 12 hours before intervention with another 40 mg before procedure, followed by long-term atorvastatin treatment 40 mg/day), this treatment prevented CIN and shortened hospital stay[59]. A meta-analysis in 2018 showed pretreatment with high dose atorvastatin was associated with a significant reduction in the prevalence of CIAKI in patients undergoing CAG[60].
5. Choice of contrast media: The KDIGO 2012, recommends use of either iso-osmolar or low-osmolar CM. Though the meta-analysis of 24 studies showed no difference

between high-osmolar and low-osmolar CM in low risk patients with normal renal function, low-osmolar agents were less nephrotoxic for patients at risk of developing CI-AKI[61]. A recent meta-analysis comparing low-osmolar versus iso-osmolar (iodixanol) contrast agents concluded that there is no difference in CI-AKI between iodixanol and pooled low-osmolar agents. However, statistically significant reduction of CI-AKI was noted when iodixanol was compared to iohexol in patients with reduced kidney function[62].

6. Dose of contrast media: The lowest dose possible should be used. Various formulas have been used to calculate the maximum dose to be used. Cigarroa's formula suggests the following contrast material limit: 5 mL of contrast per kilogram body weight/ serum creatinine (mg/dL) with maximum dose acceptable of 300 mL for diagnostic coronary arteriography[63].

A study by Jeffrey et al showed 24% increase in serum creatinine value post endovascular aortic artery aneurysm (AAA) repair. They did a review of 98 patients who underwent endovascular AAA repair in their study, 'Endovascular AAA repair in patients with renal insufficiency: strategies for reducing adverse renal events' from April, 1998 to July, 2000. Patients who were on dialysis preoperatively were excluded. A rise in creatinine above baseline was found in 24% of patients who underwent the procedure and the rise was independent of baseline creatinine value, volume of contrast used and location of device fixation (suprarenal or infrarenal)[64].

In 2011, Zaraca et al conducted a systematic review, 'Contrast Media-Induced Nephropathy in Patients Undergoing Angiography Prior to or During Vascular Surgery: A Systematic Review'. The study aimed at assessing incidence and factors associated with CIN after angiography in patients undergoing vascular surgery. They found that the overall frequency of CIN in patients undergoing vascular surgery was 9.2% (79/862). Risk factors for contrast-induced nephropathy identified in their study were age >70 years, high contrast volume, pre-existing renal disease and antihypertensive medication[65].

Chronic renal insufficiency is considered a relative contraindication for endovascular aneurysm repair. To study if it is evidence based, Guntani et al conducted a study, reviewed 46 patients with chronic renal insufficiency without hemodialysis, who underwent EVAR from April, 2009 to March, 2011. They also divided included patients into groups depending on anatomy, favourable and unfavourable and on creatinine clearance (CCr)- between 30-

50ml/min and less than 30ml/min. They followed up all the patients with mean follow-up period of 6.3 months. They found that there was no increase serum creatinine post EVAR in any of the included patient supporting that chronic renal insufficiency is not a contraindication for EVAR[66].

A systematic review, 'Acute kidney injury following peripheral angiography and endovascular therapy: a systematic review of the literature' was performed by Anand Prasad et al in 2016 to study the incidence of acute kidney injury (AKI) in patients undergoing angiography or endovascular interventions for lower extremity peripheral artery disease. They reviewed 15 studies and found that the median incidence of AKI in patients undergoing angiography or peripheral vascular interventions was 10%. However, the studies included had significant variations in patient risk factors, definitions of AKI, and specificity of description of endovascular therapies. They concluded that further systematic studies are required to assess incidence, risk factors, and outcomes related to AKI in the context of peripheral angiography or endovascular therapy[67].

Sigterman et al conducted an observational cohort study, 'Contrast Induced Nephropathy and Long-term Renal Decline After Percutaneous Transluminal Angioplasty for Symptomatic Peripheral Arterial Disease' in 2016. They aimed to establish the incidence and long term consequences of CIN in patients undergoing endovascular procedures for symptomatic peripheral arterial diseases. They defined CIN as more than 25% increase of serum creatinine concentration from baseline at 5 days after the intervention. Among 337 patients included in the study, incidence of CIN was 13%. There was significant reduction of eGFR by 50% in patients with CIN after 1 year of follow up and also, they were at increased risk of long-term cardiovascular events and mortality[68].

Shin-Rong Lee et al reviewed data of The Vascular Quality Initiative PVI from 2010 to 2018 in their study, 'Contrast-Induced Nephropathy after peripheral vascular interventions in kidney transplant recipients' to find the incidence and factors associated with kidney transplant recipient (KTR) patients who underwent intervention for peripheral vascular diseases. They found that only 1.02% of procedures were performed in patients with KTR. In their study, included patients were stratisied into KTRs with graft good function (GGF; CKD1-2, estimated glomerular filtration rate ≥60 mL/min/1.73 m^2) and KTRs with a graft with poor function (GPF; CKD3-5, estimated glomerular filtration rate <60 mL/min/1.73 m^2). The overall incidence of CIN in their study was 3%, and was significantly higher in GPF compared

with GGF (4.6% vs 1.5%). Multivariate regression analysis showed GPF and anticoagulant use were independently associated with CIN and volume of contrast had no effect on CIN[69].

A study, 'Contrast-induced Nephropathy After Peripheral Vascular Intervention: Long-term Renal Outcome and Risk Factors for Progressive Renal Dysfunction' was conducted by Zaid Al Das et al to assess long-term (1-year) renal consequences of CIN after PVI and to identify factors associated with renal function deterioration at 1-year follow-up. They reviewed patients who had PVI in their institution 2008 to 2015. CIN in their study was defined as an increase in serum creatinine concentration of at least 0.5 mg/dL within 30 days after intervention. They found out that, male sex and congestive heart failure percentage and increase in 30-day postprocedural creatinine concentration were associated with 1-year GFR decline, whereas CIN resolution by discharge was protective for renal function at 1 year. Their study also showed by post hoc analysis that, patients with CIN resolution at discharge had similar 1-year renal outcomes to non-CIN patients, whereas the CIN-persistent at discharge had greater renal deterioration at 1 year compared with non-CIN patients[70].

With this background and heterogenous results in limited data on incidence and risk factors of CIN in patients undergoing peripheral endovascular procedure, we aim to study the incidence and long-term renal effects of CIN in patients with critical limb ischemia, who underwent peripheral endovascular procedures.

AIMS AND OBJECTIVES

AIM OF THE STUDY:

1. To determine the incidence of contrast induced nephropathy in patients undergoing peripheral endovascular procedures.

OBJECTIVES OF THE STUDY:

1. To assess the incidence of contrast induced nephropathy in patients undergoing peripheral endovascular procedures for critical limb ischemia of lower limbs.
2. To assess the long term renal morbidity in patients who developed contrast induced nephropathy after endovascular procedures for critical limb ischemia of lower limbs.

MATERIALS AND METHODS

1. Study design: Single centre, prospective observational study.

2. Study location: Jain Institute of Vascular Sciences (JIVAS), a unit of Bhagwan Mahaveer Jain Hospital, Bangalore.

3. Study period: June 1, 2018 to June 1, 2020

4. Recruitment period: June 1, 2018 - Oct 1, 2019

5. Study population: Total 270 patients underwent endovascular intervention during the study period, out of which 211 patients were included in the study as per the inclusion criteria.

6. Sample size calculation:

$$N = \frac{Z^2 \times P\,(1-P)}{d^2}$$

Z = Critical value and a standard value for the corresponding level of confidence. (At 95% CI or 5% level of significance (type-I error) it is 1.96

P = Expected prevalence or based on previous research (13%)

q = 1-p

d = Margin of error or precision (0.05)

Calculated sample size is 174

(Referene:

i. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. Gastroenterology and Hepatology from bed to bench. 2013;6(1):14.

ii. Sigterman TA, Krasznai AG, Snoeijs MG, Heijboer R, Schurink GW, Bouwman LH. Contrast induced nephropathy and long-term renal decline after percutaneous transluminal angioplasty for symptomatic peripheral arterial disease. European Journal of Vascular and Endovascular Surgery. 2016 Mar 1;51(3):386-93)

7. Inclusion criteria: All the patients admitted in JIVAS, Bhagwan Mahaveer Jain Hospital with critical limb ischemia (Rutherford class IV, V, VI) requiring endovascular revascularization for iliac/ infrainguinal diseases.

8. Exclusion criteria: i) Patient with end stage renal disease who were on dialysis.
   ii) Patients who received additional iodinated contrast media during the follow up period.
   iii) Patients who had revascularisation procedure with in last 6 months of entering the study.
   iv) Patients with preoperative Serum creatinine of >1.5mg/dl.
   v) Patients who underwent intervention with CO2 angiogram.
   vi) Not willing for participation in the study.

9. Methodology:
   1. Patient enrolment: The patients who were admitted in the unit with features of critical limb ischemia were analysed in detail for all the comorbidities associated with peripheral vascular diseases by clinical history and laboratory investigations. The patients who fulfilled inclusion criteria were enrolled into the study after informed written consent. Demographic data, clinical history, physical findings and comorbidities like smoking, consumption of tobacco, diabetes mellitus (DM), hypertension (HTN), coronary artery disease (CAD), chronic kidney disease (CKD) and cerebro-vascular disease (CVD) of the included patients were recorded. In all patients general and local examination were carried out with careful documentation of vascular status of both lower limbs along with non invasive vascular lab measurements including ankle brachial index (ABI), toe brachial index (TBI), pulse volume recording (PVR) and transcutaneous oximetry (TcPO2). Preoperative imaging was based on clinical findings and was performed in form of arterial duplex, CT angiography, MR angiography and MR angiography- Time of flight (TOF) sequence. The intervention procedure was planned as per the unit protocol.

2. Laboratory analysis: Relevant investigation like Complete blood count (CBC), urea, baseline serum creatinine, urine protein to creatinine ratio in diabetic patients, glycosylated hemoglobin (HBA1c), coagulation profile, chest X ray, ECG, 2 D Echocardiogram, fasting lipid profile was recorded for all patients after enrollment into the study. The eGFR of all patients was calculated using the Modification of diet in renal disease (MDRD) formula.

3. Medical management: Patients who were planned for the endovascular procedure with iodinated contrast material were given intravenous (IV) hydration with 0.9% NaCl at 1 ml/kg/hour (0.5 ml/kg/hour if ejection fraction was <40%) 12 hours pre-procedure and for a minimum of 12 hours post procedure based on the urine output. Infusion of 150mEq/L sodium bicarbonate as a bolus of 3ml/kg/hour for 1 hour before the administration of contrast, followed by 1 mL/kg/hour for 6 hours during and after the procedure. N-acetyl cysteine of 1200mg twice daily was started one day prior to the procedure and continued for two days post procedure. All DM patients who were on oral hypoglycemic agents were switched over to regular insulin and strict glycemic control was ensured peri-operatively. Non-steroidal anti-inflammatory drugs (NSAIDs) use was restricted for 2 days prior to the procedure. Nephrotoxic medication was stopped and other alternate medications for diabetes, hypertension, cardiac conditions were used as per physician's advice. All patients received statin and antiplatelet therapy as per unit protocol.
4. Intervention: Nonionic contrast media Iohexol (300mg per ml) was used for imaging in all patients. Most of the procedures were carried out under local anaesthesia with monitored anaesthesia care (MAC) unless patient opted for general anaesthesia. All cases were done by consultant vascular and endovascular surgeons. In patients undergoing endovascular procedures for infrainguinal revascularization the approach to the target site was by an ipsilateral antegrade CFA puncture or a contralateral retrograde CFA puncture. Contralateral retrograde CFA puncture was used for iliac+infrainguinal revascularization. In patients requiring hybrid procedures, access site for endovascular intervention was decided based on the open surgical procedure done. Systemic heparinisation was done with 80U/kg body weight and then 1000units IV for every passing hour. Standard

procedure of angioplasty/stenting was performed as per the decision of treating surgeon. The amount of contrast in ml used was recorded post procedure.

5. Follow up: All enrolled patients were thoroughly examined for effectiveness of CLI treatment, focusing on the healing process and pain control, with scheduled returns to the hospital at regular intervals of 1, 3, and 6 months. Measurement of serum creatinine and eGFR calculation was done on 5^{th} day post procedure and again at 1, 3 and 6 months of follow up. Patients with and without CIN were prospectively observed for changes in eGFR, any need for dialysis or any other adverse outcomes up to 6 months.

10. Statistical analysis: The following methods of statistical analysis have been used in this study. The Excel and SPSS (SPSS Inc, Chicago v 18.5) software packages were used for data entry and analysis respectively.

    The results were averaged (mean $\pm$ standard deviation) for each parameter for continuous data and numbers and percentage for categorical data presented in Tables and Figures.

    1. Student "t' test was used to determine whether there was a statistical difference between groups in the parameters measured.

    2. Proportions were compared using Chi-square test of significance

    In all the above tests a "p" value of less than 0.05 was accepted as indicating statistical significance.

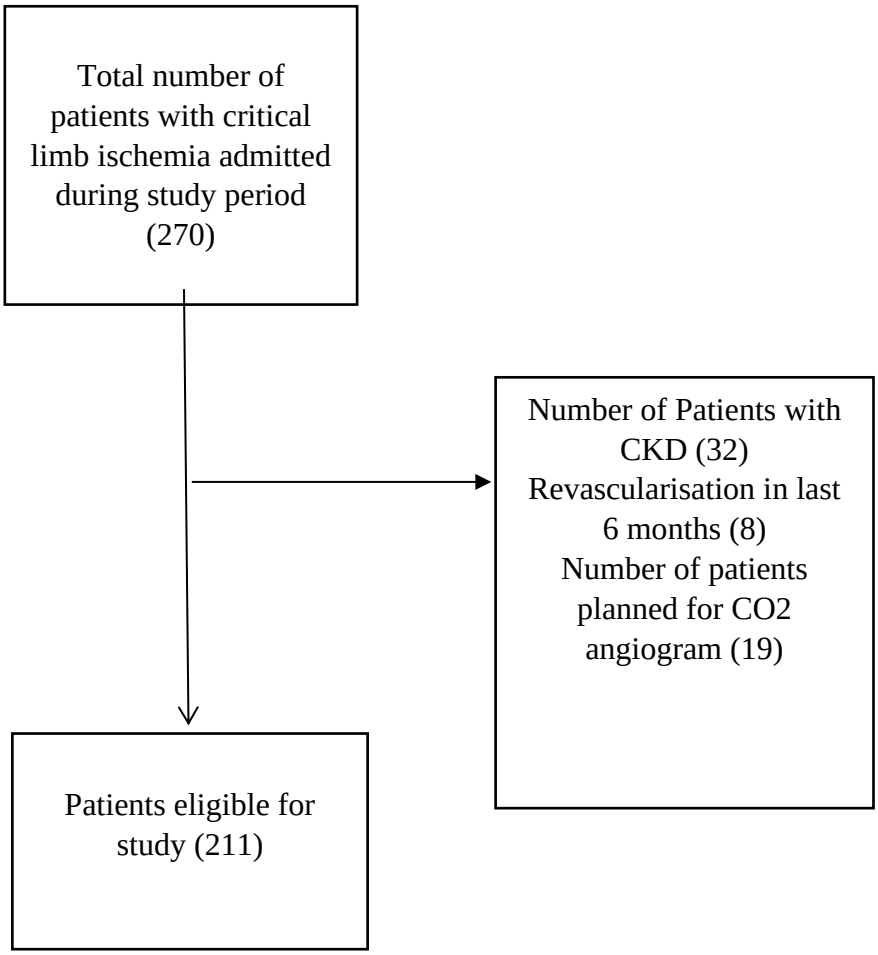
11. Ethical and scientific committee:

    Present study is approved by ethics and scientific committee of Bhagwan Mahaveer Jain Hospital, Bengalure (Annexure 4).

RESULTS

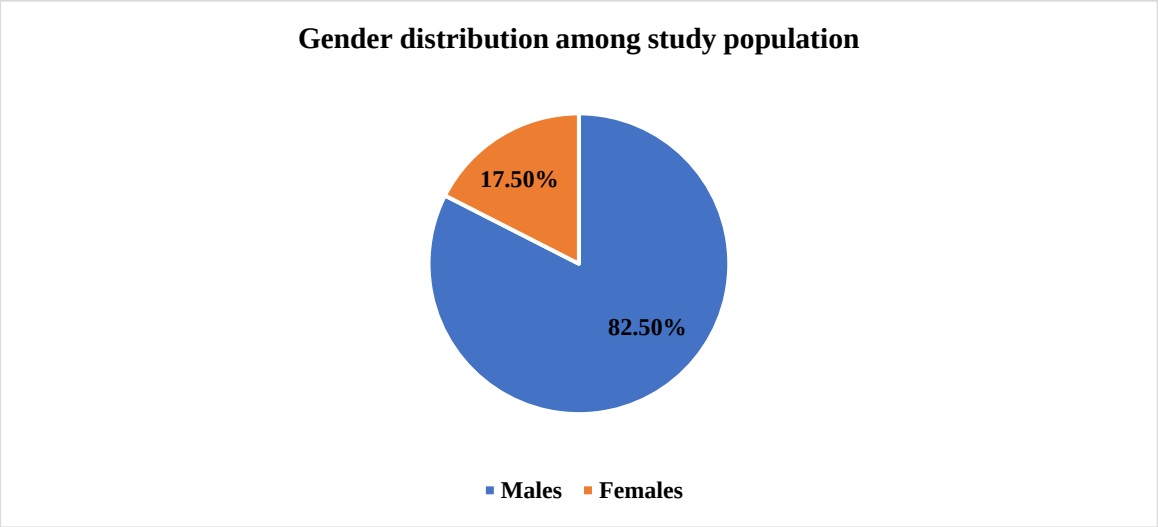
A total of 211 patients were included in the study. The incidence of CIN in our study was 7.5%. The males constituted 82.5% of study population whereas females were 17.5%. The age group varied from 34 years to 93 years with mean age of 64.3 years.

The following tables and graphs present the data of the enrolled patients.



The distribution of gender and age group of the study population is depicted in graph 1 and graph 2.

Graph 1: Gender distribution among study population



Graph 2: Age distribution among study population

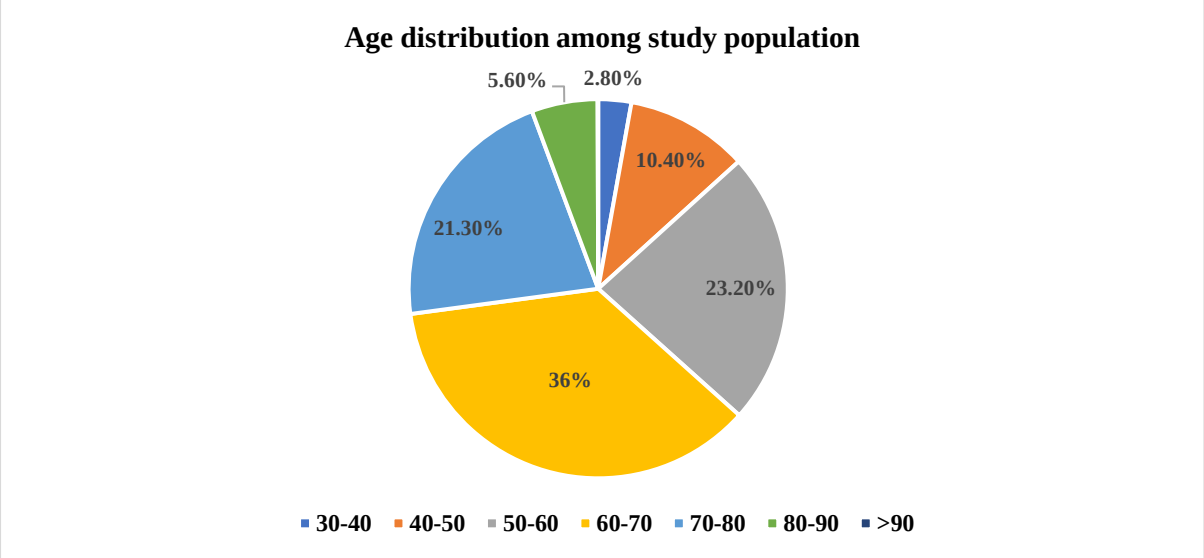


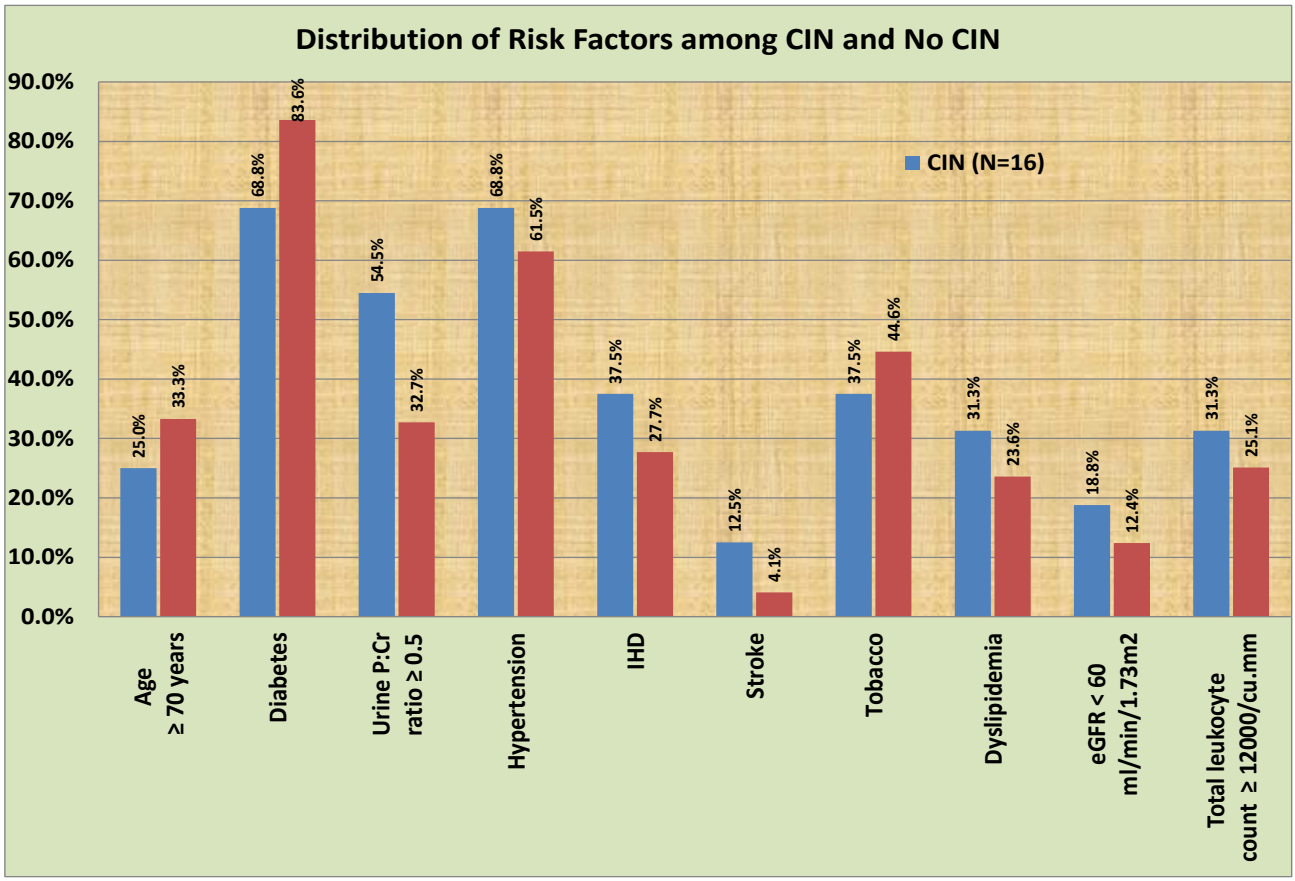
Table 3. The comorbidities in the study population with CIN and no CIN:

	CIN (N=16)		No CIN (N=195)		Total (N=211)		P value
	n	%	n	%	n	%	
Age ≥ 70 years	4	25%	65	33.3%	69	32.7%	0.495
Diabetes	11	68.8%	163	83.6%	174	82.5%	0.133
Urine P:Cr ratio ≥ 0.5	6	54.5%	53	32.7%	59	34.1%	0.139
Hypertension	11	68.8%	120	61.5%	131	62.1%	0.568
IHD	6	37.5%	54	27.7%	60	28.4%	0.403
Stroke	2	12.5%	8	4.1%	10	4.7%	0.129
Tobacco	6	37.5%	87	44.6%	93	44.1%	0.582
Dyslipidemia	5	31.3%	46	23.6%	51	24.2%	0.491
eGFR < 60ml/min/1.73m^2	3	18.8%	24	12.4%	27	12.9%	0.464
Total leukocyte count ≥ 12000/cu.mm	5	31.3%	49	25.1%	54	25.6%	0.590
WIfi stage							
1	1	6.3%	14	7.2%	15	7.1%	0.575
2	4	25%	28	14.4%	32	15.2%	
3	2	12.5%	47	24.1%	49	23.2%	
4	9	56.3%	106	54.4%	115	54.5%	
Rutherford class							
4	1	6.3%	11	5.6%	12	5.7%	
5	8	50%	105	53.8%	113	53.6%	0.957
6	7	43.8%	79	40.5%	86	40.8%	

The general characteristics of the study population is shown in table 3 and graph 3. The elderly population (> 70 years) constituted 32.7%. Critical limb ischemia class IV, V, VI as per Rutherford classification was seen in 5.75, 53.6%, 40.8% respectively. Of the total study population who underwent procedure 82.5% were diabetic and 62.1% were hypertensive. Among diabetics, 34.1 % had urine protein creatinine ratio more than 0.5. Tobacco was used by 44.1% of study population and 24.2% had altered lipid profile. A high total leukocyte count

was seen in 25.6% of patients. Significantly low eGFR (< 60ml/min) before undergoing the peripheral angiography was seen in 12.9%.

Graph 3: Distribution of risk factors among CIN and no CIN



In our study, 7.5% of the population had contrast induced nephropathy after undergoing peripheral intervention. Of them, 25% were more than 70 years old, 68.8% were diabetic, 54.5% had high urine protein creatinine ratio, 68.8% were hypertensive, 18.8% had low eGFR. Maximum number of patients who developed CIN belonged to Rutherford class V (50%) followed by class VI (43.8%). However, none of these factors posed a significant risk to develop CIN in our study.

Table 4: Sensitivity analysis: Risk factors for CIN

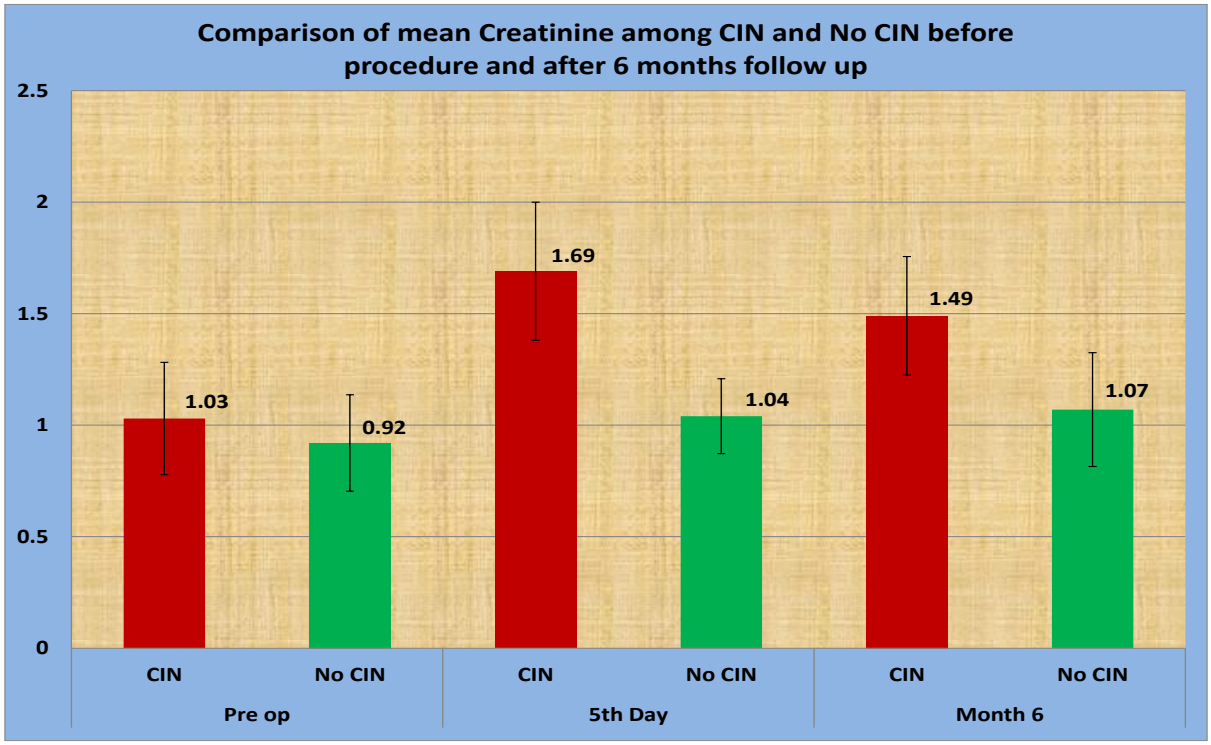
Risk factor	CIN (mean± SD)	No CIN (mean± SD)	P value
Age (years)	64.6±11.798	64.4±10.885	0.945
Creatinine	1.03± 0.25	0.92± 0.21	<0.045
Contrast volume (ml)	73.8± 31.5	52.1±18.3	<0.001
eGFR	79.6± 31.0	90.8± 27.5	0.125
Hemoglobin	10.5± 1.2	11.8 ±1.9	<0.008
WBC count /mm^3	11,584± 3471	10453± 3377	0.2
Urine P:Cr ratio	0.70± 0.48	0.52± 0.46	0.226

The risk factors which were seen significantly in patients who developed CIN are shown in Table 4. In our study, Patients who developed CIN, had higher baseline creatinine value of mean 1.03mg/dl (95^{th} CI 0.53 to 1.53) compared to non CIN patients 0.92 (95^{th} CI) [p <0.045]. Those who developed CIN had received higher contrast volume mean of 73.8ml (95^{th} CI 11.8-135.8ml) compared to those who did not develop CIN 52.1ml (95^{th} CI 15.8-88.7ml) [P < 0.001]. The patients who developed CIN also had a lower mean haemoglobin 10.5g/dl v/s 11.8g/dl [P<0.008]. Age, pre procedure mean eGFR, mean total leukocyte count and urine protein creatinine ratio did not significantly differ between the two groups (CIN v/s no CIN).

Table 5: Effect of pre-procedure Creatinine on CIN and long-term renal function decline

Visit		Mean Creatinine (mg/dl)	P value
Pre op	CIN	1.03 ± .252	0.045
	No CIN	0.92 ± .216	
5th Day	CIN	1.69 ± .310	<0.001
	No CIN	1.04 ± .168	
Month 6	CIN	1.49 ± .266	<0.001
	No CIN	1.07 ± .255	

Graph 4: Mean creatinine levels in patients with CIN and no CIN pre procedure and after 6 months follow up



As noted in table 5 and graph 4, the patients who developed CIN had higher baseline creatinine (1.03 mg/dl) and also had higher creatinine after 6 months of undergoing procedure (mean 1.49 mg/dl, 95th CI 0.96- 2.02) as compared to those who did not develop CIN (mean 1.07mg/dl) [P<0.001].

Table 6: Comparison of mean eGFR in patients with CIN and no CIN before procedure and after 6 months follow up

Contrast-Induced Nephropathy	Time	N	eGFR(ml/min/1.73m^2) Mean	SD	P value*
CIN	Pre procedure	16	79.6	31.087	0.002
	Month 6	16	50.9	7.501	
No CIN	Pre procedure	194	90.8	27.502	<0.001
	Month 6	174	74.6	17.847	

Graph 5: Comparison of mean eGFR in patients with and without CIN before and 6 months after peripheral intervention

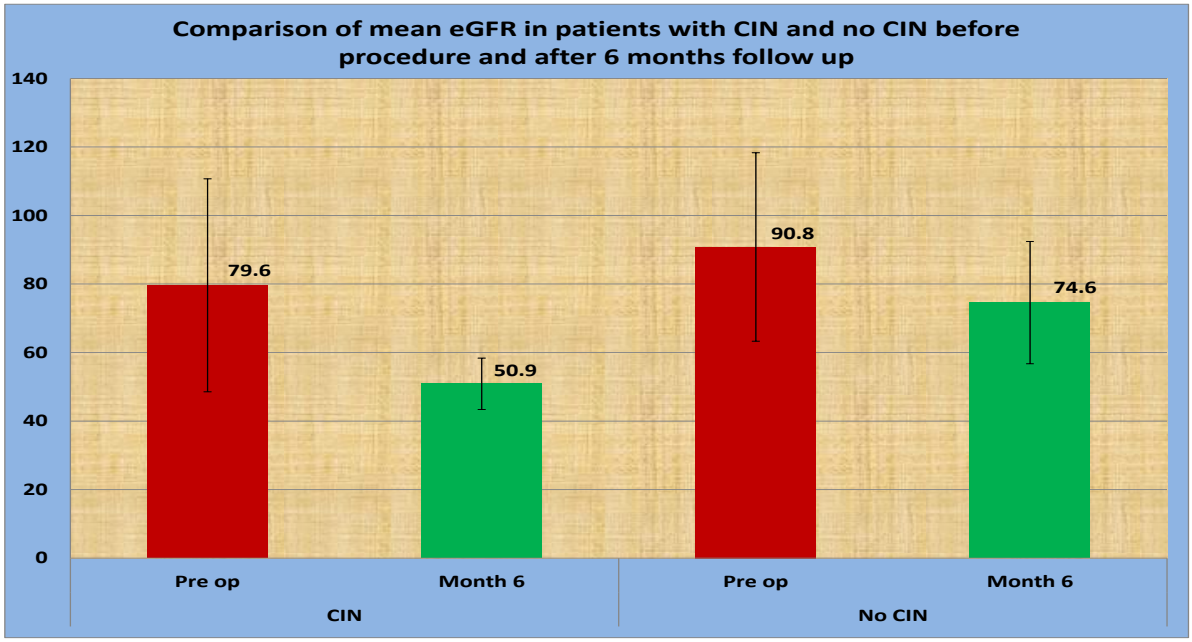
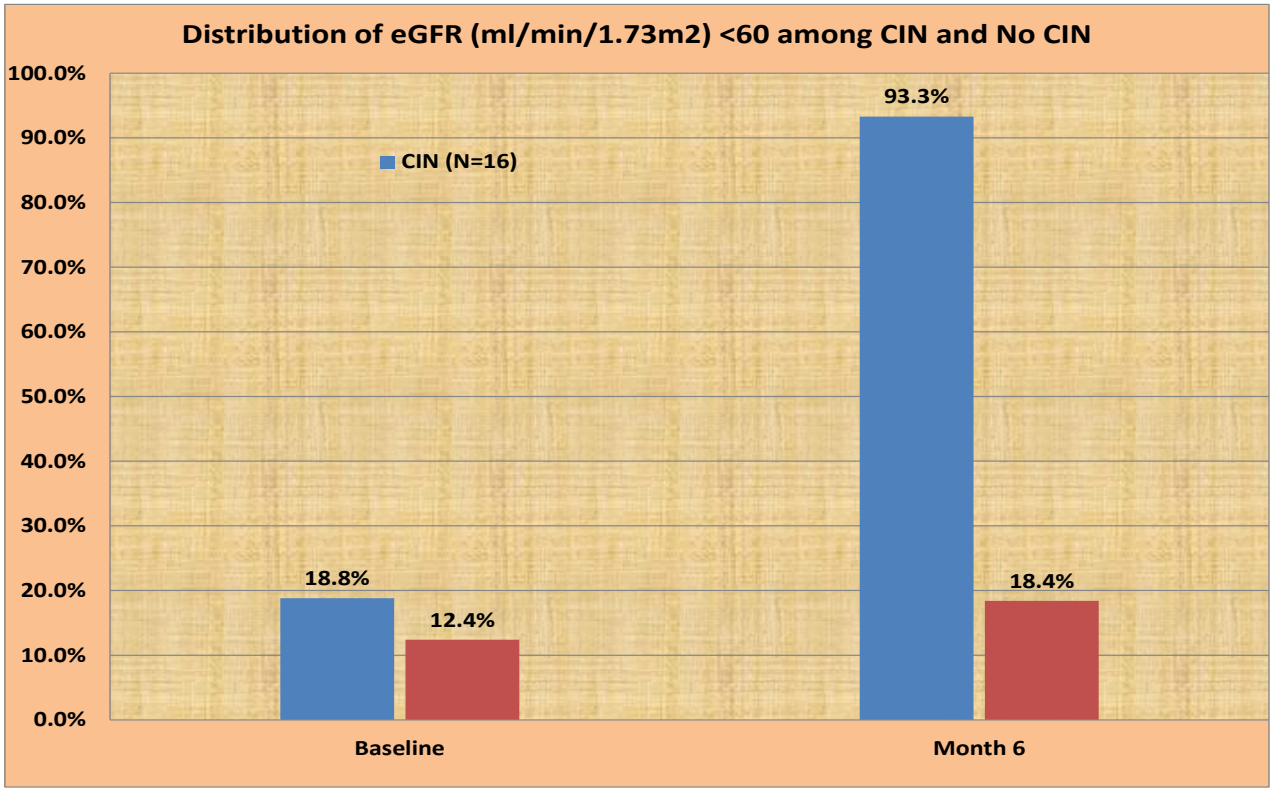


Table 6 and graph 5 shows the significant reduction in eGFR in patients who developed CIN post peripheral intervention at 6 months follow up eGFR mean of 50.9ml/min/1.73m^2 (95th CI 35.9-65.9ml/min) as compared to those who did not develop CIN (74.6ml/min, 95th CI 39-110.2ml/min) [P <0.001].

Table 7: Effect of low baseline eGFR on long term renal function decline in CIN and non CIN patients

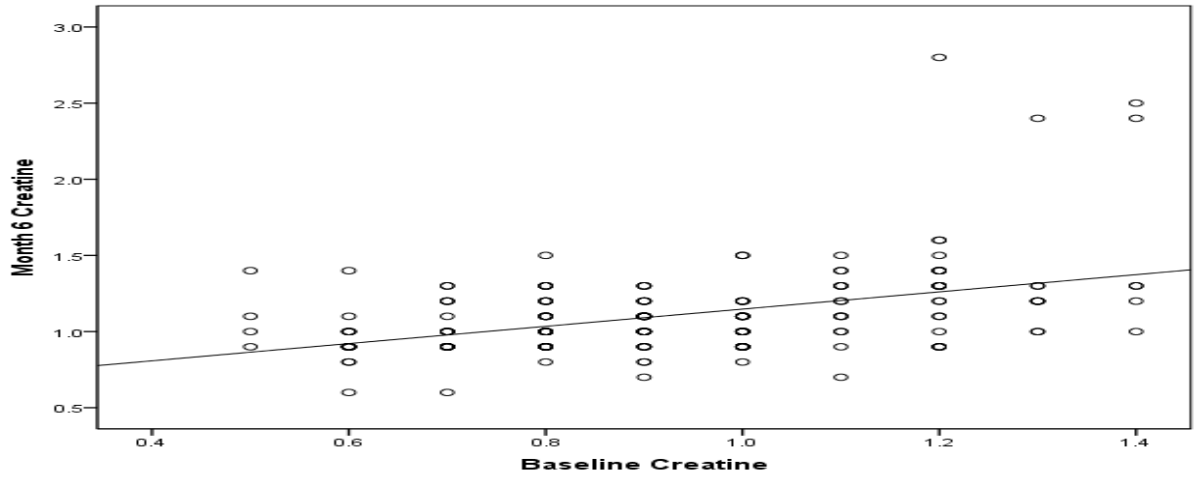
Visit		eGFR (< 60ml/min/1.73m^2)	P value
Baseline	CIN	3 (18.8%)	0.464
	No CIN	24 (12.4%)	
Month 6	CIN	14 (93.3%)	<0.001
	No CIN	32 (18.4%)	

Graph 6: Effect of low baseline eGFR on long term renal function decline in CIN and non CIN patients

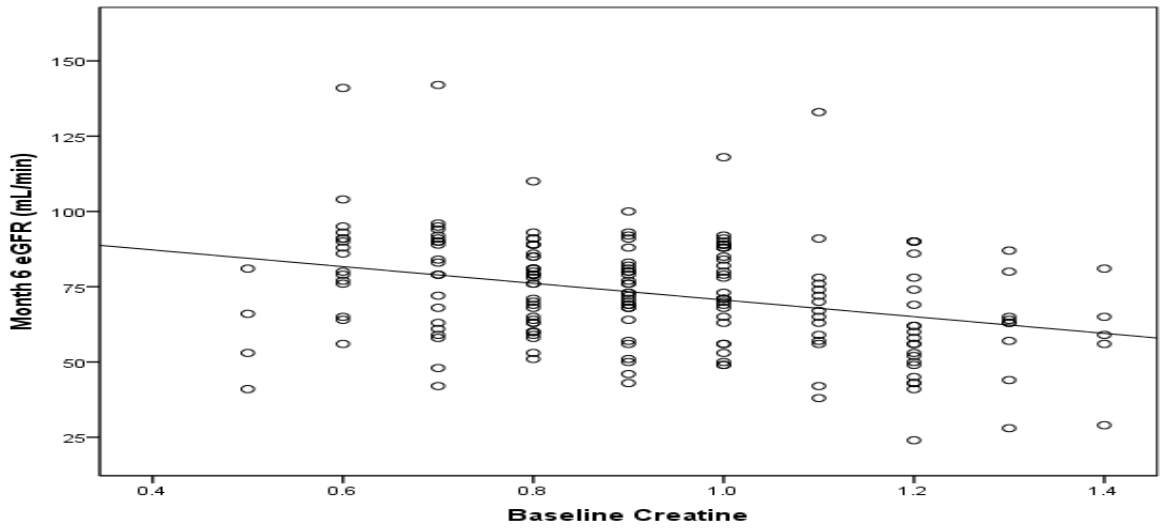


In our study, though the baseline eGFR less than 60ml/min was not significantly seen in patients who developed CIN, 93.3% of those who developed CIN had eGFR less than 60ml/min at 6 months follow up (P <0.001) as shown in table 7 and graph 6.

Graph 7: Scatter plot graph showing correlation between baseline creatinine and 6 months post procedure creatinine.



Graph 8: Scatter plot graph showing correlation between baseline creatinine and 6 months post procedure eGFR



As shown in graph 7 and 8, a positive correlation was found between baseline creatinine and long-term creatinine levels and negative correlation between baseline creatinine and long term eGFR. Both indicate that higher baseline creatinine levels are associated with long term renal function decline. However, the correlation was found to low.

DISCUSSION

In our study, we included a total of 211 patients who underwent peripheral vascular interventions for symptomatic peripheral vascular disease (Rutherford class IV, V, VI). Most of them were in the age group 60-70 years (36%) followed by 50-60 years (23.2%). Males (82.5%) predominated in our study population. All patients in this study were pre-treated with IV hydration, IV sodium bicarbonate and oral N-acetyl cysteine before the procedure. Low-osmolar contrast media (iohexol) was used in all patients. None of our patients developed acute renal failure requiring dialysis following the procedure.

Most of the population was diabetic (82.5%), hypertensive (62.1%). Tobacco was consumed by 44.1% of study population. Dyslipidaemia was present in 24.2%. Most of the population had Rutherford CLI class V (53.6%) followed by VI (40.8%).

The incidence of CIN varies greatly depending on the population age, comorbidities, type and volume of contrast used, preventive measures applied and time of measuring post procedure creatinine. Al Adas et al in their study to evaluate risk factors for long term renal decline in patients undergoing peripheral vascular intervention found incidence of CIN to be 6.5%[70]. In literature, the incidence of CIN in peripheral vascular interventions is found to be between 5.4% to 13.5% [71]. The incidence of contrast induced nephropathy in our study was 7.5% which is in agreement with the previous studies.

Several studies have shown older age is an independent risk factor for CIN. It may be due to multiple age-related factors like declining renal function, atherosclerosis etc. A study by Evola S et al to assess the risk factors of CIN found that the patients in CIN group were significantly older than no CIN group[72]. In this study, 25% of CIN patients were ≥ 70 years and 33% were in no CIN group. The older age did not differ significantly between two groups.

In this study, among those who had CIN, 68.8% were diabetic, 54.5% had high urine protein creatinine ratio of >0.5 among diabetic patients, 68.8% were hypertensive, 18.8% had low eGFR. These are well known risk factors for developing CIN post intervention and included in Mehran scoring system for CIN[73]. However, in our study the association was not found to be statistically significant (p> 0.05). A study by Gruberg et al, on prognostic implication of factors for renal function in patients undergoing coronary interventions, did not show statistically significant association between renal function deterioration and age, sex, diabetes, hypertension or dyslipidemia[74]. A study by Sandeep kumar et al, aimed at identifying risk factors for CIN after coronary angiography in Indian patients, also did not find age, sex and diabetes statistically significant association with CIN[75]. This can be explained by multifactorial risk factors and their variable contribution to development of CIN.

In our study, higher mean creatinine values (1.03mg/dl v/s 0.92mg/dl), lower mean eGFR (79.6ml/min v/s 90.8ml/min) were found to be significant risk factors for developing CIN. Higher mean contrast volume was used in CIN group (73.8ml v/s 52.1ml) in our study. These findings are in agreement with a study by Gruberg et al, who found mean higher creatinine value and higher mean contrast volume was used in patients who developed post contrast renal function deterioration[74]. Grossman et al also found in their study, in patients undergoing peripheral vascular interventions, higher contrast volume was associated with increased risk of CIN[76]. A study to find the relationship between contrast volume eGFR and CIN incidence by Nyman et al found higher incidence of CIN in patients with higher contrast volume to eGFR ratio[77].

It was noticed that lower mean haemoglobin (10.5g/dl v/s 11.8g/dl) was seen in patients with CIN in the present study. Similar findings were noted by Nikolsky et al in their study to establish relationship of low haematocrit and CIN after percutaneous coronary procedures,

found increased incidence of CIN in patients with low haematocrit. Further they also noticed that CIN rate was highest in patients who had both low eGFR and low haematocrit[78].

Many studies have found increased adverse events in patients who develop CIN – worsening renal function, death, cardiac events like MI, stroke etc. A significant eGFR decline by 50% was noted in patients with CIN at 1year of follow up by T.A. Sigterman et al in their study[68]. A study was conducted by Solomon et al to know the causal relationship between CIN and adverse effects. In their study, as a follow up of CARE study, long term adverse effects of CIN in patients who underwent coronary angiography were analysed. The study showed adverse events including end stage renal disease was significantly high in patients with CIN[79].

In our study, at 6 months follow up, patients who developed CIN post procedure had increased creatinine as compared to those who did not develop CIN (1.49mg/dl v/s 1.07mg/dl). It was also noted that CIN patients had lower eGFR compared to no CIN group at 6 months follow up (Tables 5,6,7 and graphs 4,5,6). Both these findings suggest that CIN is associated with long term renal function decline. Further supporting this, in our study, a positive correlation (Graph 7) was found between baseline and 6 months follow up creatinine values and negative correlation (Graph 8) between baseline creatinine and 6 months follow up eGFR though the correlation was low.

Hence, with this study we can conclude that contrast induced nephropathy is still can occur in patients with low risk patients even with the use of preventive measures. The risk factors for CIN vary significantly, pre procedure renal function and contrast media volume used are important risk factors. The study warrants the Vascular surgeons to monitor all the patients who undergo endovascular procedures for CIN. Further research with randomised control studies and large sample size are required to definitely associate the risk factors for CIN and long-term effects of CIN in peripheral endovascular procedures.

Limitations of the study:

1. The study assessed the risk factors for CIN but cannot associate them to CIN, as it was a prospective observational study.
2. The patients at risk of CIN (chronic kidney disease, creatinine value more than 1.5mg/dl, ESRD) were excluded and the incidence found in this study cannot be generalised.
3. The same low osmolar contrast agent was used for all patients in the study and hence the incidence of CIN with other contrast media could not be assessed.
4. The follow up period in the study was limited to 6 months but long-term outcome of CIN patients may require follow up for longer duration.

SUMMARY AND CONCLUSION:

Contrast induced nephropathy, though studied thoroughly in literature, remains one of controversial topics with widely variable and often questionable incidence. Extensive literature on CIN exits in coronary angiograms and CT scans, but there is limited data on CIN in peripheral vascular surgery. The aim of this study is to determine the incidence of contrast induced nephropathy in patients undergoing peripheral endovascular procedures for critical limb ischemia and its long-term renal outcome.

It is a single centre, prospective observational study conducted over the period of 2 years. In the study, 211 patients were included who underwent peripheral vascular interventions and were followed up for 6 months. The included patients baseline creatinine and eGFR were calculated. Post procedure serum creatinine was measured at 5^{th} day, 1, 3 and 6 months. Statistical analysis was done to know the incidence of CIN and its long-term renal outcome by estimating eGFR at 6 months follow up creatinine.

In this study, incidence of CIN was found to be 7.5%. Pre procedure creatinine, contrast volume and anaemia were found to be significant risk factors for CIN. CIN patients developed renal function decline in the form increased creatinine and decreased eGFR at 6 months follow up.

The contrast induced nephropathy is a known complication with variable incidence in patients undergoing endovascular procedures for peripheral vascular diseases even with preventive measures and hence all patients require careful monitoring for CIN. The CIN patients have long term renal morbidity and hence their regular follow up and prevention of CIN is important.

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(Visipaque); Iohexol (Omnipaque); Iomeprol (Iomeron); Iopromide (Ultravist); Ioversol (Optiray); Ioxaglate (Hexabrix); Ioxitalaminic acid (Telebrix). [Cross ref]

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ANNEXURES

ANNEXURE I

Definitions

Diabetes mellitus defined as baseline fasting blood glucose levels of > 126mg/dl, HbA1c (>6.5%) or the need for glucose lowering treatment according to the World Health Organization Criteria.[1]

Hypertension defined as having high blood pressure (systolic blood pressure > 140mg Hg and /or diastolic blood pressure >90 mm Hg) and/or receiving antihypertensive treatment for at least 1 year before inclusion in study.[2]

Coronary artery disease (CAD) defined as a history of angina pectoris, myocardial infarction, congestive heart disease, or prior coronary artery revascularizations.[3]ACS

Cerebro-vascular disease (CVD) defined as a history of stroke, transient ischemic attack, or carotid artery revascularization.[4]

Dyslipidemia was defined as serum low density lipoprotein (LDL) cholesterol >100mg/dl or Total cholesterol > 200mg/dl, or having been treated for dyslipidemia[5].

Chronic kidney disease is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health," and requires one of two criteria documented or inferred for >3 months: either GFR <60 ml/min/1.73 m2 or markers of kidney damage, including albuminuria[6].

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ANNEXURE II

Study proforma:

Name: Date

Sex:

Age:

IP number:

Diagnosis:

Co morbidities:

i.	Diabetes	Yes ☐	No	☐
ii.	Hypertension	Yes ☐	No	☐
iii.	Cerebrovascular accidents	Yes ☐	No	☐
iv.	IHD	Yes ☐	No	☐
v.	Chronic kidney disease	Yes ☐	No	☐
vi.	Tobacco use	Yes ☐	No	☐
vii.	Dyslipidemia	Yes ☐	No	☐

Laboratory Investigations:

Preoperative:

Haemoglobin	
Total wbc count	
Platlets	
Urea	
Creatinine	
Na^+	

K^+	
URINE PROTEIN CREATININE RATIO	
2 D ECHO	
eGFR calculation	

Hb A1c		
Lipid profile	Total Triglycerides	
	Total Cholesterol	
	HDL	
	LDL	
	VLDL	

Intra operative:

Procedure performed-

Volume of dye used-

Post procedure: (baseline for evaluation in subsequent visits)

	5^{TH} DAY	1 month	3 month	6 month
Sr Creatinine				

e-GFR				
Cardiovascular events				
Death				

CIN – Y/N

Dialysis – Y/N

ANNEXURE III

PATIENT INFORMATION SHEET

Angiography is the gold standard technique to identify obstruction site in peripheral arterial diseases. Contrast agents enhance visualisation of the arteries. The contrast agents have adverse effects and one of them is contrast induced nephropathy, that is effect on kidney. These agents will decrease the kidney functioning, which can be detected by measuring serum creatinine value. The creatinine is a metabolic product of proteins which is excreted by kidney. Hence it helps in assessing kidney functioning. The advantage of measuring creatinine post procedure is that, contrast induced nephropathy can be detected and managed early.

The angiography and angioplasty will be done as required for the disease and no other procedure will be done.

INFORMED CONSENT FORM

A STUDY THE INCIDENCE OF CONTRAST INDUCED NEPHROPATHY AND LONG-TERM OUTCOME OF RENAL FUNCTION AFTER PERCUTANEOUS TRASNSLUMINAL ANGIOPLASTY FOR SYMPTOMATIC PERIPHERAL ARTERIAL DISEASE."

I hereby give consent to undergo the procedure_____
for the study conducted by Dr. Vishal V.H under the guidance of Dr.Vishnu M of Jain Institute of Vascular Sciences(JIVAS), Bhagwan Mahaveer Jain Hospital,Bangalore.

I have been informed the benefits, costs, reasons for the procedure as indicated by the clinical observation and the diagnostics performed. I will be undergoing a procedure which is required as a treatment modality for my condition and that will need administration of contrast agent. The contrast agents have adverse effects and one of them is acute kidney injury. In this study, blood samples will be collected after the procedure to detect the condition and if present will be treated with standard protocols. I also have been explained that there is no major risk associated with this study as only extra samples of blood will be collected.

I consent to the usage of the data observed during the course of my treatment, photography or televising of the procedure for the purpose of advancing medical education or its publication in scientific journals provided my identity is not revealed by the pictures or description in the accompanying texts.

I have been explained the above details in my own language-_____ understood by me and I give consent and absolve the hospital authorities, its doctors and the staff in the event of any complication.

	Name	Signature	Date	Time
Patient				
Witness				
Doctor				

ANNEXURE IV

Ethics Committee letter

ETHICS COMMITTEE ON HUMAN RESEARCH
BHAGWAN MAHAVEER JAIN HOSPITAL
A UNIT OF BHAGWAN MAHAVEER MEMORIAL JAIN TRUST
Millers Road, Vasanthnagar, Bangalore - 560 052.
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e-mail : bmjh.mdoffice@gmail.com

APPROVAL CERTIFICATE OF DISSERTATION FOR NBE

Approval has been granted by Ethics Committee of Bhagwan Mahaveer Jain Hospital for the following Dissertation as per NBE requirement **INCIDENCE OF CONTRAST INDUCED NEPHROPATHY AND LONG TERM OUTCOME OF RENAL FUNCTION AFTER PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY FOR SYMPTOMATIC PERIPHERAL ARTERIAL DISEASE** Conducted by **Dr. VISHAL V. HUDGI** Department of **VASCULAR SCIENCES** under the guidance of **DR. VISHNU N** approximate period of study is from **JU NE 2018 TO DECEMBER 2019.**

Ethics Committee meeting held on **14/06/2018.**

Date : 25/06/2018

Dr. (Wg Cdr) M.D.Marker
Member Secretary
BMJH Ethics Committee

Member Secretary of
Ethics Committee on Human Research
Bhagwan Manaveer Jain Hospital
Miller's Road, Vasanthnagar
Bangalore-560 052

Scientific Committee letter

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GreenOT

SCIENTIFIC COMMITTEE

APPROVAL CERTIFICATE OF DISSERTATION FOR NBE

Approval has been granted by Scientific Committee of Bhagwan Mahaveer Jain Hospital for the following Dissertation as per NBE requirement **INCIDENCE OF CONTRAST INDUCED NEPHROPATHY AND LONG TERM OUTCOME OF RENAL FUNCTION AFTER PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY FOR SYMPTOMATIC PERIPHERAL ARTERIAL DISEASE** Conducted by **Dr. VISHAL V. HUDGI** Department of **VASCULAR SCIENCES** under the guidance of **DR. VISHNU N** approximate period of study is from **JU NE 2018 TO DECEMBER 2019.**

Scientific Committee meeting held on **13/06/2018.**

Date : 22/06/2018

Dr. Preethi Adoni
Chair Person
Scientific Committee
Deputy Medical Director
BHAGWAN MAHAVEER JAIN HOSPITAL
#17, MILLERS ROAD, VASANTHNAGAR,
BANGALORE - 560 052

ANNEXURE V

MASTER CHART

SL. NO	Age	Sex	WIfI	WIFI Stage	Rutherford class	Tobacco use	Diabetes	Hypertension	CAD	CVD	CKD	Dyslipidemia	Respiratory disorders	IC/CO2	Contrast used(ml)	revascularisation within 6months	Pre operative lab							Post Op creatinine				EGFR At 6th month	CIN Y/N	Dialysis	MACE		All cause mortality		Lost to follow up	
																	HB	WBC	UREA	CREATININE	URINE P:C RATIO	EGFR	HBA1C	5TH DAY	1MONTH	3MONTH	6MONTH		Y/N	Y/N	Y/N	DURATION	Y/N	DURATION	Y/N	DURATION
1	77	M	W2I2FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	50	N	13.8	14200	21.2	0.9	0.4	87	6.6	1.1	1	1.2	1.1	69	N	N	N	N	N	N	N	N
2	54	F	W2I2FI2	4	VI	N	Y	Y	N	Y	N	Y	N	IC	80	N	10.2	21,200	22	1.1	0.3	55	6.4	1.6	1.5	1.3	1.4	42	Y	N	N	N	N	N	N	N
3	66	M	W2I1FI1	3	VI	Y	N	N	N	N	N	N	N	IC	50	N	8.9	12,280	20	0.8	N/A	103	N/A	1	1	1.1	1.3	59	N	N	N	N	N	N	N	N
4	93	M	W0I2FI0	2	IV	N	Y	N	N	N	N	N	N	IC	30	N	11.9	13,800	109	1.2	0.4	60	7.4	1.9	1.4	1.3	1.6	43	Y	N	N	N	N	N	N	N
5	56	M	W3I2FI1	4	VI	N	Y	Y	N	N	N	N	N	IC	40	N	11.2	11,400	33	1.1	0.3	74	12.6	1	1.2	1	1.1	74	N	N	N	N	N	N	N	N
6	57	M	W3I3FI2	4	VI	Y	Y	N	Y	Y	N	N	N	IC	70	N	10.7	9,840	19.98	0.9	0.6	92	10.8	0.8	1	0.9	1.1	73	N	N	N	N	N	N	N	N
7	75	M	W2I3FI1	4	VI	N	Y	Y	N	N	N	N	N	IC	30	N	10.7	9,650	27	1.3	0.5	57	9.7	1,2	1	1.1	1.2	63	N	N	N	N	N	N	N	N
8	49	M	W2I2FI2	4	V	N	Y	Y	N	N	N	N	N	IC	60	N	15.9	9,800	25	1.1	0.3	76	9.6	1.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	1
9	76	M	W1I3FI1	4	V	Y	N	Y	N	N	N	N	N	IC	60	N	14.9	6,670	15.9	0.8	N/A	100	N/A	1.1	0.9	1.2	1.2	63	N	N	N	N	N	N	N	N
10	57	F	W2I3FI0	4	V	N	Y	Y	N	N	N	Y	N	IC	80	N	12.1	10,600	44	1.2	0.4	49	13.9	1.3	1.1	1.3	1.4	41	N	N	N	N	N	N	N	N
11	48	M	W0I3FI0	3	V	Y	N	N	N	N	N	N	N	IC	80	N	10.4	12,100	11.3	0.8	N/A	110	N/A	0.9	1	0.9	1.1	76	N	N	N	N	N	N	N	N
12	47	M	W1I1FI0	2	V	Y	Y	N	N	N	N	N	N	IC	60	N	14.1	12200	15.4	0.9	0.4	96	8	0.9	0.9	1	1.2	69	N	N	N	N	N	N	N	N
13	49	F	W2I2FI2	4	VI	N	Y	N	N	N	N	N	N	IC	70	N	10.3	12600	10	1	0.3	63	7	1	1.1	1	1.1	56	N	N	N	N	N	N	N	N
14	80	F	W2I3FI1	4	VI	N	Y	Y	N	N	N	N	N	IC	50	N	9.1	9600	10	0.9	0.5	64	8	1.1	1	0.9	1.1	51	N	N	N	N	N	N	N	N
15	67	F	W2I1FI1	3	V	N	Y	N	N	N	N	N	N	IC	70	N	10.5	18500	40	1.2	0.4	48	11.5	0.9	1.1	1.2	1.3	43	N	N	N	N	N	N	N	N
16	74	M	W2I0FI1	2	VI	N	Y	N	Y	N	N	N	N	IC	90	N	9.9	11200	25	1	0.3	78	9	1.9	1.6	1.4	1.5	49	Y	N	N	N	N	N	N	N
17	79	F	W1I1FI1	2	V	N	Y	Y	Y	N	N	N	N	IC	60	N	11.9	6900	29.8	0.9	0.5	64	8.5	0.9	1	1	1.2	46	N	N	N	N	N	N	N	N
18	77	M	W2I1FI1	3	V	N	N	N	N	N	N	N	N	IC	40	N	9.5	9700	20	0.9	N/A	87	N/A	0.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	1
19	64	M	W2I3FI1	4	V	Y	N	Y	N	N	N	N	N	IC	80	N	9.1	11900	40.6	1.2	N/A	65	N/A	1.8	1.6	1.4	1.5	50	Y	N	N	N	N	N	N	N
20	69	M	W0I2FI0	2	IV	N	Y	N	N	N	N	N	N	IC	30	N	14.4	11960	22	0.8	0.4	102	7.3	1	0.8	0.9	1	79	N	N	N	N	N	N	N	N
21	62	F	W2I2FI1	4	VI	Y	Y	N	Y	N	N	N	N	IC	50	N	10.2	10600	24	0.8	0.3	77	7	0.6	0.9	1.2	1	60	N	N	Y	2	N	N	N	N
22	50	M	W2I0FI1	2	V	N	Y	Y	N	N	N	N	N	IC	40	N	10.7	10400	18.1	0.7	0.5	127	10.4	1	0.9	0.9	1	84	N	N	N	N	N	N	N	N
23	67	F	W2I3FI1	4	V	N	N	Y	N	N	N	Y	N	IC	30	N	10.1	10900	17.2	0.6	N/A	106	N/A	0.8	1	1.1	0.8	76	N	N	N	N	N	N	N	N
24	73	M	W2I0FI1	2	VI	Y	Y	N	Y	N	N	N	N	IC	30	N	8.1	16190	35	1.3	0.3	58	13.8	1.1	1.2	1.1	1.2	63	N	N	N	N	N	N	N	N
25	57	M	W0I2FI0	2	IV	Y	Y	N	N	N	N	N	N	IC	100	N	12.7	11200	17.7	0.9	0.3	92	9.2	1	1.1	1.2	1	82	N	N	N	N	N	N	N	N
26	65	M	W2IOFI1	2	VI	N	Y	Y	N	N	N	N	N	IC	80	N	10	12100	25	1.2	0.3	65	7	1.2	1	1.3	0.9	90	N	N	N	N	N	N	N	N
27	65	F	W1I1FI0	1	V	N	Y	Y	N	N	N	N	N	IC	70	N	9.6	1300	20	1.3	0.8	44	9.1	1.2	1.1	1.2	1.3	44	N	N	N	N	N	N	N	N
28	84	M	W2I2FI2	4	VI	N	Y	N	N	N	N	N	N	IC	60	N	10.5	17200	17	0.9	0.6	85	8.2	0.8	1	1.9	1.1	68	N	N	N	N	N	N	N	N
29	40	M	W0I2FI0	2	IV	N	N	N	N	N	N	N	N	IC	40	N	14.6	7400	21	0.6	N/A	158	N/A	0.9	1	0.9	1.1	79	N	N	N	N	N	N	N	N
30	70	M	W3I1FI2	4	VI	N	Y	Y	Y	N	N	N	N	IC	120	N	10.1	9300	30	1.2	0.6	64	9	2	1.6	1.7	1.4	53	Y	N	N	N	N	N	N	N
31	70	M	W2I1FI0	3	VI	N	Y	Y	N	Y	N	N	N	IC	30	N	12.9	9700	30	0.8	2.9	102	9.5	0.9	0.8	1	1.1	70	N	N	N	N	N	N	N	N
32	48	M	W2I1FI3	4	VI	Y	Y	Y	N	N	N	N	N	IC	40	N	10.2	13800	24	0.7	1.2	128	12.3	0.9	1	1.1	0.9	96	N	N	N	N	N	N	N	N
33	59	F	W2I3FI1	4	VI	N	Y	Y	N	N	N	N	N	IC	30	N	13	12000	30	1	2.7	60	10.8	1.2	1	1	1.2	49	N	N	N	N	N	N	N	N
34	58	M	W2I1FI0	3	V	Y	N	Y	Y	N	N	N	N	IC	70	N	12.6	8200	22	1	N/A	82	N/A	1.1	1.1	0.8	1	82	N	N	N	N	N	N	N	N
35	50	M	W0I1FI0	1	IV	N	Y	N	N	N	N	N	N	IC	30	N	10.4	17900	17.1	0.6	0.4	152	7	1	1.1	1.2	0.9	95	N	N	N	N	N	N	N	N
36	70	F	W0I3FI2	3	IV	N	Y	Y	Y	N	N	N	N	IC	40	N	12.8	8800	26	0.7	0.4	88	7	1	1.1	0.9	1	58	N	N	N	N	N	N	N	N
37	55	M	W2I0FI0	2	V	N	Y	N	N	N	N	N	N	IC	50	N	13.1	10500	31	1.1	0.3	74	8.5	0.9	1	1.2	1.2	67	N	N	N	N	N	N	N	N
38	66	M	W3I3FI2	4	VI	N	Y	N	N	Y	N	N	N	IC	70	N	10.2	10500	47	1.2	1.3	64	12.1	1.3	1	1.1	0.9	90	N	N	N	N	N	N	N	N
39	54	M	W3I2FI2	4	VI	Y	Y	Y	N	N	N	N	N	IC	60	N	11.3	11000	19	0.8	0.4	107	12.7	0.9	0.9	0.8	0.9	93	N	N	N	N	N	N	N	N
40	60	F	W2I2FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	80	N	9.7	10700	24	0.9	0.4	68	10.6	1	1.1	1	0.9	68	N	N	N	N	N	N	N	N
41	60	M	W3I1FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	70	N	11.8	14500	31	0.8	0.4	105	7	1	0.9	1.1	1	81	N	N	N	N	N	N	N	N
42	60	M	W2I1FI2	4	VI	N	Y	Y	Y	N	N	N	Y	IC	30	N	10	6200	37	1	0.3	81	11.6	1.1	1	0.9	0.9	91	N	N	N	N	N	N	N	N
43	65	F	W1I3FI1	3	V	N	N	N	N	N	N	N	N	IC	50	N	13	13100	33	0.7	N/A	89	N/A	1	0.9	1.1	1.2	48	N	N	N	N	N	N	N	N
44	68	M	W2I2FI1	4	V	Y	Y	Y	N	N	N	N	N	IC	40	N	14.8	7200	24	0.8	0.3	102	11.3	0.9	0.9	0.9	1	79	N	N	N	N	N	N	N	N
45	52	M	W3I3FI1	4	VI	Y	Y	Y	N	N	N	Y	N	IC	60	N	9.4	8300	21	0.7	0.3	126	9	0.9	1.1	1	0.9	94	N	N	N	N	N	N	N	N
46	73	M	W3I2FI2	4	V	N	Y	N	N	N	N	N	N	IC	30	N	12.2	5400	25	0.8	0.4	101	8.5	1	1.1	0.9	1	78	N	N	N	N	N	N	N	N
47	50	M	W1I1FI1	2	V	Y	N	N	Y	N	N	N	N	IC	100	N	10	9000	27	1.2	N/A	68	N/A	1.9	1.5	1.4	1.6	49	Y	N	N	N	N	N	N	N
48	50	M	W2I1FI1	3	V	Y	Y	Y	N	Y	N	N	N	IC	50	N	13.9	7900	28	1	0.3	84	7.4	1.1	1	1.2	1	84	N	N	N	N	N	N	N	N
49	50	M	W3I2FI2	4	VI	Y	Y	N	Y	N	N	Y	N	IC	80	N	9.9	10500	30	0.8	0.4	109	11.1	1	1.2	1	1.2	68	N	N	Y	3	N	N	N	N
50	66	M	W1I2FI0	2	V	N	Y	N	N	N	N	N	N	IC	30	N	9.3	8300	19.2	0.8	0.4	103	9.3	0.8	0.9	1.1	1	81	N	N	N	N	N	N	N	N
51	57	M	W2I0FI2	3	V	Y	Y	N	N	N	N	N	N	IC	40	N	15	16000	40	1	0.4	82	8.4	1.2	0.9	0.8	1.1	73	N	N	N	N	N	N	N	N
52	86	M	W1I0FI0	1	V	N	Y	Y	N	N	N	N	N	IC	30	N	10.2	10000	25	0.7	0.3	114	10.9	1.1	1	1.3	1.2	61	N	N	Y	1	Y	1	N	N
53	75	M	W3I3FI3	4	VI	N	Y	Y	Y	N	N	N	N	IC	90	N	9.1	11000	17.3	0.9	0.8	87	8	1.3	1.1	1.2	1.3	57	N	N	Y	1	N	N	N	N
54	64	F	W1I1FI1	2	V	N	Y	Y	N	N	N	N	N	IC	40	N	11.1	11500	19	0.5	0.3	132	7.3	1.1	0.9	1	1.1	53	N	N	N	N	N	N	N	N
55	55	F	W2I0FI3	4	V	N	Y	Y	N	N	N	N	N	IC	80	N	10.2	15320	41	1.2	1.2	50	13.6	1.5	1.3	1.2	1.3	45	N	N	N	N	N	N	N	N
56	65	M	W3I1FI2	4	VI	Y	Y	Y	N	N	N	N	Y	IC	50	N	10.8	18130	29	0.7	0.4	120	9.2	0.9	1	0.8	0.9	90	N	N	N	N	N	N	N	N
57	65	M	W2I3FI2	4	VI	N	Y	N	N	N	N	N	N	IC	30	N	15	13600	27	0.6	1.2	144	13.8	0.9	1.2	1.2	1	80	N	N	Y	6	N	N	N	N
58	68	M	W2I1FI1	3	V	N	Y	Y	Y	N	N	N	N	IC	30	N	12.6	7870	15.2	1	0.3	79	9.1	1.1	1.1	1.2	0.9	89	N	N	N	N	N	N	N	N
59	49	M	W2I2FI2	4	V	Y	Y	N	N	N	N	N	N	IC	50	N	13.5	15930	14.2	0.9	0.8	95	14	0.9	0.8	0.9	1.1	76	N	N	N	N	N	N	N	N
60	58	M	W2I2FI2	4	V	N	Y	N	Y	N	N	Y	N	IC	40	N	11.7	10280	21	0.9	0.08	92	10.9	1	1.1	1	0.9	92	N	N	N	N	N	N	N	N
61	72	M	W1I3FI0	3	V	Y	N	Y	N	N	N	Y	N	IC	30	N	12.9	10200	20	1.1	N/A	70	N/A	1	1.1	0.9	1.3	63	N	N	N	N	N	N	N	N
62	65	M	W2I1FI1	3	V	N	Y	N	Y	N	N	Y	N	IC	50	N	11.1	10300	22	1.1	0.05	71	7.4	1.2	1	1.3	1.3	59	N	N	N	N	N	N	N	N
63	64	M	W1I1FI1	2	V	N	Y	Y	N	N	N	Y	N	IC	30	N	12.4	6000	24	1.4	0.8	54	11.2	1.5	1.2	1.4	1.3	59	N	N	N	N	N	N	N	N
64	68	M	W1I3FI0	3	V	N	Y	Y	Y	Y	N	N	N	IC	50	N	13	8900	30	1.2	0.8	64	11.7	1.3	1	1.2	1.3	58	N	N	N	N	N	N	N	N
65	67	M	W2I1FI1	3	V	N	Y	Y	N	N	N	Y	N	IC	40	N	10.7	12060	35	1	1.2	79	12	1.7	1.3	1.4	1.5	50	Y	N	N	N	N	N	N	N
66	78	M	W0I3FI0	3	IV	Y	Y	Y	N	N	N	Y	N	IC	70	N	12.5	6300	28	1	0.2	77	8.3	1	0.9	0.8	1.1	69	N	N	N	N	N	N	N	N
67	72	M	W2I1FI1	4	V	Y	Y	Y	N	N	N	Y	N	IC	90	N	11.3	12700	30	1.1	0.4	70	11	1.2	1	0.9	1.1	70	N	N	N	N	N	N	N	N
68	69	M	W2I1FI0	3	VI	Y	Y	Y	N	N	N	N	N	IC	70	N	12.4	9310	22	1	0.02	79	9.6	1.1	1	1	1.1	71	N	N	N	N	N	N	N	N
69	47	M	W2I1FI2	4	V	Y	Y	N	N	N	N	Y	N	IC	40	N	16.5	10210	28	0.8	0.3	110	7	0.9	1.1	0.9	1	85	N	N	N	N	N	N	N	N
70	54	F	W2I2FI2	4	VI	N	Y	Y	Y	N	N	Y	N	IC	60	N	9.3	11000	33	0.9	0.8	69	9	1.1	1.2	1	1.2	50	N	N	N	N	N	N	N	N
71	52	M	W2I2FI2	4	VI	Y	Y	Y	N	N	N	Y	Y	IC	60	N	11.1	9220	25	1.2	1.46	68	8.8	1.8	1.2	1.3	1.4	56	Y	N	N	N	N	N	N	N
72	56	M	W2I3FI2	4	VI	Y	Y	N	N	N	N	N	N	IC	70	N	10.3	10170	38	1.4	0.4	56	8.9	1.3	1.2	1.6	2.5	29	N	Y	N	N	N	N	N	N
73	82	M	W2I0FI0	2	VI	Y	Y	N	Y	N	N	N	N	IC	120	N	12.1	10530	19	0.9	0.2	89	8.7	1	1.1	1	1.3	56	N	N	N	N	N	N	N	N
74	73	M	W1I3FI1	3	VI	Y	Y	Y	N	N	N	N	N	IC	40	N	12.4	5830	9	0.8	0.3	101	6.6	0.9	1	0.9	1.3	58	N	N	N	N	N	N	N	N
75	80	M	W1I2FI1	3	VI	Y	N	Y	Y	N	N	N	N	IC	50	N	13	7210	11	0.8	N/A	99	N/A	1.1	0.9	1	0.9	86	N	N	N	N	N	N	N	N
76	72	M	W2I2FI2	4	VI	N	Y	N	N	N	N	N	N	IC	30	N	13.1	8500	60	0.6	0.29	141	8.4	0.8	0.7	0.9	0.6	141	N	N	N	N	N	N	N	N
77	39	M	W1I1FI1	2	VI	Y	N	Y	Y	N	N	N	N	IC	40	N	14.8	10500	23	1	N/A	88	N/A	1.2	1.1	0.9	1	88	N	N	N	N	N	N	N	N
78	70	F	W2I3FI2	4	VI	N	Y	Y	Y	N	N	N	N	IC	20	N	10	7700	24	0.9	0.8	66	10.2	1	1.2	1	1.3	43	N	N	N	N	N	N	N	N
79	76	M	W2I1FI0	3	V	Y	Y	Y	N	N	N	N	N	IC	40	N	11.3	8900	22	1	0.4	77	8.9	0.7	1	1.1	1.2	63	N	N	N	N	N	N	N	N
80	55	F	W2I3FI0	4	VI	N	N	N	Y	N	N	N	N	IC	70	N	9	10380	13.8	0.5	N/A	136	N/A	1.2	1.1	1.2	1.4	41	Y	N	Y	3	N	N	N	N
81	34	M	W1I0FI1	1	VI	N	N	N	N	N	N	N	N	IC	80	N	16.7	14200	12	1	N/A	91	N/A	1.1	1	0.9	0.8	118	N	N	N	N	N	N	N	N
82	60	F	W2I2FI1	4	V	N	Y	Y	N	N	N	N	N	IC	50	N	13.5	11600	12	0.7	0.8	91	8.3	1	1.1	1	0.9	68	N	N	N	N	N	N	N	N
83	75	M	W2I1FI1	3	V	Y	Y	N	N	N	N	N	N	IC	30	N	10	10200	27	1	0.7	77	10.6	1	1	1.2	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	6
84	58	M	W0I2FI0	2	IV	Y	Y	N	Y	N	N	Y	N	IC	20	N	15.6	7800	22	0.7	0.8	123	9.7	0.9	1	1.1	0.9	92	N	N	N	N	N	N	N	N
85	48	M	W3I3FI0	4	V	Y	Y	N	N	N	N	Y	N	IC	70	N	14.8	5900	41	1	0.8	85	9.8	1.1	0.9	0.9	1	85	N	N	N	N	N	N	N	N
86	74	M	W1I3FI1	3	V	Y	Y	N	N	N	N	N	N	IC	40	N	11.2	8800	30	1.1	0.4	70	10.1	1.2	1.2	1	1.3	57	N	N	N	N	N	N	N	N
87	63	M	W1I2FI0	2	V	Y	Y	N	N	N	N	N	N	IC	80	N	17	8900	24	0.9	0.2	91	9.1	1	0.9	0.9	1	80	N	N	N	N	N	N	N	N
88	59	M	W2I0FI1	2	V	N	Y	Y	N	N	N	Y	N	IC	80	N	9.6	9600	32	0.8	0.4	105	7	0.7	1	1.3	1.5	51	N	N	N	N	N	N	N	N
89	69	M	W1I3FI2	4	V	N	Y	N	N	N	N	N	N	IC	30	N	13.2	10300	24	0.8	0.2	102	7	0.9	0.6	0.8	1	79	N	N	N	N	N	N	N	N
90	70	M	W1I3FI0	3	V	N	Y	N	N	N	N	N	N	IC	50	N	12.2	9200	22	0.7	0.24	119	6.2	0.9	0.5	0.8	0.6	142	N	N	N	N	N	N	N	N
91	40	M	W0I2FI0	2	IV	Y	N	N	Y	N	N	Y	N	IC	40	N	11.8	8200	13	1.1	N/A	79	N/A	1	0.9	1.1	0.7	133	N	N	N	N	N	N	N	N
92	54	M	W3I2FI2	4	VI	N	Y	N	N	N	N	Y	N	IC	40	N	12.5	13500	29	0.7	0.3	125	7.2	1	0.9	0.9	1	83	N	N	N	N	N	N	N	N
93	70	M	W2I2FI1	4	V	Y	N	N	N	N	N	N	N	IC	50	N	9.9	6870	23	0.7	N/A	119	N/A	0.8	1	0.9	1	79	N	N	N	N	N	N	N	N
94	50	M	W2I3FI2	4	VI	Y	Y	N	N	N	N	N	N	IC	80	N	15	10500	23	1	0.3	84	9.3	1	0.9	1	1.2	68	N	N	N	N	N	N	N	N
95	69	M	W2I2FI2	4	VI	Y	Y	N	N	N	N	Y	N	IC	100	N	11.6	7600	25	1	1.2	79	14.3	1.1	1	0.9	0.9	89	N	N	N	N	N	N	N	N
96	59	F	W2I2FI0	3	VI	N	Y	N	N	N	N	N	N	IC	40	N	10.7	9300	12	0.8	0.6	78	8	1.1	0.7	0.9	1	60	N	N	N	N	N	N	N	N
97	64	M	W3I2FI2	4	VI	Y	Y	Y	N	N	N	N	N	IC	50	N	12	11300	27	1.2	0.8	65	11.7	0.9	1	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	1
98	65	M	W1I3FI2	4	V	N	N	Y	N	N	N	Y	N	IC	70	N	10	9800	15	0.8	N/A	103	N/A	0.9	1.4	0.7	1.2	65	Y	N	N	N	N	N	N	N
99	80	M	W2I3FI2	4	V	Y	Y	N	N	N	N	N	N	IC	30	N	8.2	9200	31	0.9	0.3	86	6.9	1	1.1	0.9	1	76	N	N	N	N	N	N	N	N
100	77	F	W2I2FI2	4	VI	N	N	Y	N	N	N	N	N	IC	30	N	14.2	15500	10	0.7	N/A	86	N/A	1.4	1.2	1	1.3	42	N	N	N	N	N	N	N	N
101	72	M	W2I0FI1	2	V	N	Y	Y	N	N	N	Y	N	IC	60	N	12.7	10900	42	1.2	1.4	43	14.2	1.1	0.8	0.9	1	78	N	N	N	N	N	N	N	N
102	69	M	W1I3FI0	3	V	N	Y	Y	N	N	N	N	N	IC	70	N	12	10020	14	1	0.15	79	6.2	1.1	1.2	0.9	1	79	N	N	N	N	N	N	N	N
103	74	M	W3I3FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	80	N	10	8900	24	0.9	0.22	88	12	0.9	1	1	1.1	70	N	N	N	N	N	N	N	N
104	66	F	W1I1FI0	1	V	Y	Y	Y	N	N	N	N	N	IC	40	N	9.2	11200	17	1	0.4	59	10	0.9	0.8	1	1.1	53	N	N	N	N	N	N	N	N
105	72	F	W2I2FI0	3	V	N	Y	Y	Y	N	N	N	N	IC	70	N	12	9600	17	0.6	0.32	104	9.6	1	0.7	0.8	0.9	65	N	N	N	N	N	N	N	N
106	67	F	W2I3FI2	4	VI	N	Y	Y	Y	N	N	Y	N	IC	50	N	11	1200	24	0.5	0.32	131	6.2	0.9	1.2	1	0.9	66	N	N	Y	1	Y	6	N	N
107	54	M	W2I0FI1	2	VI	Y	Y	Y	Y	N	N	N	N	IC	80	N	11	13400	37	1.1	1.2	74	11.3	1.7	1.4	1.3	1.4	56	Y	N	N	N	N	N	N	N
108	80	M	W1I1FI0	1	V	N	Y	Y	Y	N	N	Y	N	IC	30	N	9.9	8700	60	1.2	2.3	62	9	1.3	1.1	1	1.2	62	N	N	N	N	N	N	N	N
109	65	M	W1I0FI1	1	V	Y	N	N	N	N	N	N	N	IC	70	N	10.8	8700	22	0.8	N/A	103	N/A	1	0.9	1	1.1	71	N	N	N	N	N	N	N	N
110	61	M	W2I3FI1	4	VI	N	Y	Y	N	N	N	Y	N	IC	100	N	12.5	11200	30	0.8	0.2	104	6.5	1	1	1.1	0.9	91	N	N	N	N	N	N	N	N
111	73	M	W3I3FI2	4	VI	N	Y	Y	N	N	N	Y	N	IC	50	N	10.7	10200	38	1.1	0.4	70	11	1.2	1	0.9	1	78	N	N	N	N	N	N	N	N
112	67	M	W1I1FI0	1	V	Y	Y	Y	Y	N	N	N	N	IC	70	N	14	9500	11	0.9	0.2	89	8.6	1	1.1	1	1.2	64	N	N	N	N	N	N	N	N
113	82	F	W1I1FI0	1	V	N	Y	N	Y	N	N	N	N	IC	80	N	11	6600	18	0.9	0.32	64	8	1.1	0.9	0.9	0.8	73	N	N	N	N	N	N	N	N
114	79	M	W1I3FI0	3	V	N	Y	Y	N	N	N	N	N	IC	50	N	12.2	8800	21	0.8	0.23	87	7	0.9	0.9	1	1.1	69	N	N	N	N	N	N	N	N
115	80	M	W2I1FI2	4	V	Y	N	N	N	N	N	N	N	IC	30	N	12	11700	35	1.2	N/A	62	N/A	1.4	1.2	1.1	1.4	52	N	N	Y	6	N	N	N	N
116	85	M	W2I0FI2	3	VI	N	Y	Y	N	N	N	N	N	IC	60	N	10.2	11900	26	0.9	0.38	85	8.2	1.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N/A	Y	1
117	39	M	W2I3FI1	4	V	N	Y	N	N	N	N	Y	N	IC	50	N	15	14200	21	0.6	0.23	159	11.4	0.9	0.8	0.9	1	88	N	N	N	N	N	N	N	N
118	59	M	W3I2FI0	4	VI	Y	Y	Y	Y	N	N	N	N	IC	30	N	11	6700	22	0.5	0.07	181	7.2	0.9	0.8	0.9	1	81	N	N	N	N	N	N	N	N
119	76	M	W1I3FI0	3	V	N	Y	Y	N	N	N	N	N	IC	70	N	12	8500	21	1.3	0.26	57	8.2	1	1.2	1.6	2.4	28	N	Y	N	N	N	N	N	N
120	69	M	W2I1FI1	3	V	Y	Y	Y	N	N	N	N	N	IC	60	N	9.1	10900	12	0.7	0.13	119	8.4	1.1	1	0.9	1	79	N	N	N	N	N	N	N	N
121	47	M	W2I0FI1	2	V	Y	N	N	N	N	N	N	N	IC	40	N	14.2	6400	19	0.8	N/A	110	N/A	1	1	0.9	0.8	110	N	N	N	N	N	N	N	N

122	75	M	W3I2FI2	4	VI	Y	Y	Y	Y	N	N	N	N	IC	50	N	8.8	18740	37	0.9	1.8	87	10.2	1	0.9	0.8	1	77	N	N	N	N	N	N	N	N
123	82	M	W2I2FI1	4	VI	N	Y	Y	N	N	N	N	N	IC	40	N	11.7	8640	47	1.2	0.3	62	9.4	1.3	0.9	1	1.2	62	N	N	N	N	N	N	N	N
124	70	M	W3I2FI2	4	VI	N	Y	N	N	N	N	N	N	IC	40	N	10.4	12950	45	1.3	0.4	58	12.9	1	0.9	1.1	1.2	64	N	N	N	N	N	N	N	N
125	66	M	W1I0FI1	1	V	N	Y	Y	Y	N	N	N	N	IC	40	N	11.3	5400	31	0.9	0.23	90	7.2	1.2	1	1	1.1	71	N	N	N	N	N	N	N	N
126	63	M	W0I3FI0	2	IV	Y	Y	Y	N	N	N	N	N	IC	30	N	14.9	8300	31	1.4	0.5	54	9	1.5	1.3	1.2	1.2	65	N	N	N	N	N	N	N	N
127	63	M	W2I3FI2	4	V	N	Y	Y	N	Y	N	N	N	IC	60	N	9.8	9800	27	1.1	0.3	72	7.4	1	1.2	1	1.1	72	N	N	N	N	N	N	N	N
128	67	M	W1I0FI1	1	V	N	Y	Y	N	N	N	N	N	IC	60	N	13.1	10500	27	0.8	0.28	102	6.2	1	0.8	0.9	0.9	89	N	N	N	N	N	N	N	N
129	64	M	W2I2FI2	4	VI	Y	Y	Y	N	N	N	N	N	IC	30	N	9.4	13600	32	1	0.12	80	7	1.2	1	1.1	1.2	65	N	N	N	N	N	N	N	N
130	70	M	W2I3FI1	4	VI	Y	Y	Y	Y	N	N	N	N	IC	60	N	14.1	8200	21	0.8	0.28	102	11.2	1	0.9	0.9	1	79	N	N	N	N	N	N	N	N
131	68	M	W3I3FI2	4	VI	N	Y	Y	N	N	N	Y	N	IC	80	N	11.1	10200	21	0.7	0.4	119	10.2	0.8	0.7	0.8	0.9	89	N	N	N	N	N	N	N	N
132	62	M	W3I1FI2	4	VI	Y	Y	N	Y	N	N	N	N	IC	50	N	9.6	9600	20	0.6	0.3	145	6.8	0.7	0.9	1	0.9	91	N	N	Y	2	Y	1	N	N
133	51	M	W1I3FI0	3	V	N	Y	Y	N	N	N	N	N	IC	80	N	11.8	11200	25	0.7	0.78	126	9	1	1.1	1	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	6
134	59	F	W2I1FI1	3	V	N	Y	Y	N	N	N	N	N	IC	60	N	9.8	8800	17	0.9	0.23	68	9.8	0.8	0.8	0.7	0.7	91	N	N	N	N	N	N	N	N
135	76	M	W2I1FI1	3	V	N	N	Y	N	N	N	N	N	IC	50	N	10	14200	22	0.9	N/A	97	N/A	1.1	1	0.9	0.8	100	N	N	N	N	N	N	N	N
136	67	F	W3I3FI2	4	VI	N	Y	Y	Y	N	N	N	N	IC	30	N	10	12100	19	0.8	0.4	76	9.8	0.9	1	1.1	0.9	53	N	N	N	N	N	N	N	N
137	65	M	W2I1FI1	3	VI	N	Y	Y	Y	N	N	N	N	IC	80	N	11.3	7700	22	1.2	0.3	65	8.2	1.4		1.5	2.8	24	N	Y	N	N	Y	6	N	N
138	70	M	W3I1FI2	4	VI	N	Y	N	N	N	N	N	N	IC	60	N	12.4	15700	27	0.8	0.43	102	10.5	1	0.9	0.8	0.9	89	N	N	N	N	N	N	N	N
139	74	M	W3I2FI1	4	VI	Y	Y	Y	Y	N	N	N	N	IC	40	N	9.6	8700	40	1	1.2	78	9.7	1.1	0.9	0.9	1	78	N	N	N	N	N	N	N	N
140	55	M	W1I2FI0	2	V	Y	N	N	Y	N	N	N	N	IC	50	N	13	8900	23	0.8	N/A	107	N/A	1	0.9		1.2	60	N	N	N	N	N	N	N	N
141	54	M	W2I0FI2	3	V	Y	Y	Y	Y	N	N	N	N	IC	40	N	10.2	10500	33	0.9	0.26	93	6.9	1	0.9	0.9	1	83	N	N	N	N	N	N	N	N
142	43	M	W2I3FI0	4	VI	N	N	Y	Y	N	N	N	N	IC	50	N	15	10700	28	1.3	N/A	64	N/A	1.2	0.9	1.2	1	87	N	N	N	N	N	N	N	N
143	47	M	W0I1FI0	1	V	Y	Y	N	N	N	N	Y	N	IC	50	N	17	7800	19	0.8	0.11	110	7.5	0.9	1.1	1	1.1	76	N	N	N	N	N	N	N	N
144	78	F	W3I3FI1	4	VI	N	Y	Y	N	N	N	N	N	IC	50	N	9.2	10700	22	0.6	0.23	103	6.7	0.8	0.7	0.9	0.9	64	N	N	N	N	N	N	N	N
145	67	M	W3I2FI1	4	VI	Y	Y	Y	Y	Y	N	N	N	IC	70	N	10.9	16600	34	0.7	0.14	120	8	1.9	1.5	1.2	1.3	59	Y	N	N	N	Y	6	N	N
146	60	M	W2I3FI1	4	V	Y	N	N	N	N	N	N	N	IC	60	N	8.9	13000	50	1.4	N/A	55	N/A	1.5	1.1	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	3
147	78	M	W2I3FI2	4	V	Y	Y	N	N	N	N	Y	N	IC	60	N	12	18000	52	1.2	0.15	62	10.2	1.2	1	1.1	1.1	69	N	N	N	N	N	N	N	N
148	75	M	W2I1FI1	3	V	Y	Y	Y	Y	N	N	N	N	IC	50	N	9.9	7890	27	1.3	0.2	57	5.9	1.2	1	1.2	1.3	57	N	N	N	N	N	N	N	N
149	65	M	W2I3FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	70	N	12.3	9700	31	0.7	0.26	120	5.7	1	0.7	0.5			N	N	N	N	N	N	N	N
150	83	M	W2I3FI1	4	V	N	Y	Y	N	N	N	N	N	IC	150	N	9.1	7500	45	1.2	0.8	61	8.2	1.8	1.4	1.4	1.3	56	Y	N	N	N	N	N	N	N
151	60	M	W3I3FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	40	N	11.6	17600	51	1.4	0.14	55	7.5	1.3	1	1.2	1	81	N	N	N	N	N	N	N	N
152	55	M	W1I2FI0	3	V	Y	N	N	N	N	N	N	N	IC	60	N	9.5	11500	15	0.6	N/A	149	N/A	1.3	1.4	1.2	1.4	56	Y	N	N	N	N	N	N	N
153	85	F	W2I3FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	40	N	10.2	21000	29	1	0.23	56	7.2	0.8	1	0.7	1	56	N	N	N	N	N	N	N	N
154	65	M	W2I0FI1	2	V	N	Y	Y	N	N	N	N	N	IC	40	N	12.9	8200	41	0.7	0.4	120	13	1	1.1	0.9	0.9	90	N	N	N	N	N	N	N	N
155	58	M	W2I2FI1	4	V	N	Y	Y	N	N	N	N	N	IC	70	N	11	7.2	24	1	0.6	82	7.4	1.1	0.7	0.8	0.9	92	N	N	N	N	N	N	N	N
156	65	M	W1I1FI0	1	V	Y	Y	Y	N	N	N	N	N	IC	40	N	15.2	6680	20	1	0.5	80	6.9	1.2	1.1	0.9	1.1	71	N	N	N	N	N	N	N	N
157	69	F	W1I2FI0	2	V	N	Y	Y	N	N	N	Y	N	IC	70	N	11	8570	28	0.9	0.4	66	8	1	0.9	0.8	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	1
158	63	M	W2I3FI1	4	V	Y	Y	Y	N	N	N	N	N	IC	30	N	11	7600	23	1.1	1.6	72	7.6	1	0.7	0.8	0.9	91	N	N	N	N	N	N	N	N
159	63	M	W0I3FI0	2	IV	Y	N	Y	N	N	N	Y	N	IC	40	N	14	11000	21	0.9	N/A	91	N/A	1.3	1.2	1	1.1	72	N	N	N	N	N	N	N	N
160	48	F	W3I3FI2	4	VI	N	Y	N	N	N	N	Y	N	IC	40	N	10.4	18000	20	0.5	2.2	140	14.8	N/A	1.1	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N/A	Y	6
161	82	M	W2I2FI2	4	V	N	Y	Y	Y	N	N	N	N	IC	50	N	11	12500	43	1.1	0.32	68	9.3	1.1	1	0.9	1	76	N	N	N	N	N	N	N	N
162	59	M	W2I0FI2	3	VI	N	Y	Y	N	N	N	N	N	IC	50	N	12.5	21000	42	1.2	0.8	66	8.4	1.1	1	1.2	1.3	60	N	N	N	N	N	N	N	N
163	50	M	W2I1FI0	3	V	N	Y	Y	N	N	N	Y	N	IC	60	N	13	9500	17	0.7	0.1	127	7.6	1	1.1	0.9	0.9	95	N	N	N	N	N	N	N	N
164	63	M	W2I3FI2	4	VI	N	Y	Y	Y	N	N	N	N	IC	70	N	13	7660	27	1.3	0.3	59	7.9	1.4	1.2	1.1	1.2	65	N	N	N	N	N	N	N	N
165	80	M	W2I3FI0	4	V	N	Y	Y	N	N	N	N	N	IC	40	N	16	7600	27	1.2	0.23	62	8	1.3	1.1	1	0.9	86	N	N	N	N	N	N	N	N
166	64	M	W2I2FI2	4	VI	Y	Y	N	N	N	N	N	N	IC	30	N	11	10830	16	0.6	0.3	144	10.7	0.6	0.8	0.7	0.9	90	N	N	N	N	N	N	N	N
167	70	M	W1I1FI0	1	V	N	Y	N	N	N	N	N	N	IC	60	N	12	10080	30	0.8	1	102	7.1	1	0.9	0.9	0.9	89	N	N	N	N	N	N	N	N
168	55	M	W3I3FI2	4	VI	N	Y	N	N	N	N	N	N	IC	50	N	10.6	5890	25	0.9	0.45	93	8.8	1	0.8	0.7	0.9	93	N	N	N	N	N	N	N	N
169	65	M	W1I2FI1	3	V	Y	Y	Y	N	N	N	N	N	IC	30	N	10	9800	40	1	0.67	80	16	1.2	1.1	1.3	1	80	N	N	N	N	N	N	N	N
170	72	M	W2I2FI1	4	V	N	Y	N	Y	N	N	N	N	IC	80	N	10	8900	32	1	1.2	78	8	1.1	0.9	1	1.1	70	N	N	N	N	N	N	N	N
171	74	M	W2I2FI3	4	VI	N	Y	Y	Y	N	N	Y	Y	IC	40	N	11.8	18700	23	0.7	0.3	117	10.5	1.1	1	1.1	1.2	63	N	N	N	N	N	N	N	N
172	38	M	W2I1FI1	3	V	Y	N	N	N	N	N	N	N	IC	30	N	15	10200	17	0.9	N/A	100	N/A	1.2	1	1	1.1	80	N	N	N	N	N	N	N	N
173	74	F	W2I3FI1	4	V	N	Y	Y	N	N	N	Y	N	IC	60	N	11	11700	18	1	0.18	58	9.5	1.1	0.9	0.8	0.9	88	N	N	N	N	N	N	N	N
174	59	M	W3I3FI2	4	VI	N	Y	Y	N	N	N	N	N	IC	50	N	11.4	10200	27	0.9	0.14	92	8.9	1.2	1	1.1	1	81	N	N	N	N	N	N	N	N
175	72	M	W2I1FI2	4	V	Y	Y	Y	Y	N	N	Y	N	IC	30	N	14	9800	23	1	0.2	78	5.9	1		0.9	0.9	88	N	N	N	N	N	N	N	N
176	82	M	W1I3FI1	3	V	Y	Y	Y	N	N	N	N	N	IC	60	N	10.8	5650	41	1.4	0.3	52	9.5	1.2	1	1.1	1.3	56	N	N	N	N	N	N	N	N
177	74	M	W3I3FI2	4	VI	Y	Y	Y	N	N	N	Y	N	IC	30	N	13	10700	35	0.8	0.8	100	12.8	0.9	1	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	1
178	63	M	W2I3FI1	4	V	Y	Y	N	Y	N	N	N	N	IC	30	N	10.9	8790	24	0.6	0.5	145	5.8	0.9	0.8	0.9	0.8	104	N	N	N	N	N	N	N	N
179	59	M	W2I3FI3	4	VI	N	Y	Y	N	Y	N	N	N	IC	40	N	10	13700	22	0.8	1.2	105	8.8	1	0.9	0.9	1	81	N	N	N	N	N	N	N	N
180	59	M	W2I1FI2	4	VI	Y	Y	Y	Y	N	N	N	N	IC	80	N	10.2	11490	17	0.8	0.8	105	9.2	N/A	1.1	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	3
181	60	M	W2I3FI1	4	V	N	Y	Y	N	Y	N	N	N	IC	40	N	11	11790	30	0.8	0.5	105	12.4	1	1.2	0.8	0.9	91	N	N	N	N	N	N	N	N
182	55	M	W0I3FI0	2	IV	Y	Y	Y	Y	N	N	Y	N	IC	50	N	15.8	8500	16	0.6	0.13	149	6.5	0.9	0.8	0.8	0.9	93	N	N	N	N	N	N	N	N
183	64	M	W2I2FI1	4	V	Y	Y	Y	N	N	N	N	N	IC	30	N	9.1	7890	20	1	0.2	80	8.5	1.2	1	0.9	0.9	90	N	N	N	N	N	N	N	N
184	65	M	W2I3FI2	4	VI	N	Y	Y	N	N	N	Y	N	IC	50	N	11.7	13980	37	1.3	0.45	59	12.5	1.4	1	0.9	1	80	N	N	N	N	N	N	N	N
185	56	M	W2I3FI2	4	V	N	Y	Y	Y	N	N	N	N	IC	30	N	10.2	16700	35	1.2	1.6	67	6.7	1.3	0.9	0.9	1.1	74	N	N	N	N	N	N	N	N
186	61	F	W2I3FI1	4	V	N	Y	Y	N	N	N	N	N	IC	50	N	13.3	10799	20	1.1	1.2	54	12	1.6	1.4	1.4	1.5	38	Y	N	N	N	N	N	N	N
187	62	M	W2I2FI1	4	V	Y	N	N	Y	N	N	Y	N	IC	80	N	12	8700	26	0.6	N/A	145	N/A	1	0.8	0.9	0.9	91	N	N	N	N	N	N	N	N
188	42	M	W1I2FI0	2	V	Y	N	N	N	N	N	Y	N	IC	50	N	14	11800	24	0.8	N/A	112	N/A	1	1.1	0.8	1.3	64	N	N	N	N	N	N	N	N
189	66	M	W2I2FI1	4	V	Y	N	N	Y	N	N	N	N	IC	50	N	15	7780	25	0.9	N/A	90	N/A	1.1	0.9	0.8	1	79	N	N	N	N	N	N	N	N
190	62	M	W2I3FI1	4	V	N	Y	Y	N	N	N	Y	N	IC	50	N	13.7	6700	32	1.1	0.3	73	7	1.2	1	1	1.2	65	N	N	N	N	N	N	N	N
191	74	M	W2I0FI2	3	V	Y	Y	Y	N	N	N	N	N	IC	60	N	12.3	15670	12	0.9	0.8	88	9.4	1	0.6	0.7	0.9	88	N	N	N	N	N	N	N	N
192	85	M	W2I3FI2	4	V	N	Y	N	N	N	N	N	N	IC	80	N	10.3	5890	22	0.8	1	98	9.2	1	1.1	0.9	0.9	85	N	N	N	N	N	N	N	N
193	65	M	W2I2FI2	4	VI	Y	Y	N	Y	N	N	N	N	IC	40	N	9.5	9300	47	0.8	0.3	103	7	1	1.2	1.1	1	80	N	N	N	N	N	N	N	N
194	78	M	W2I1FI2	4	V	N	Y	Y	N	N	N	N	N	IC	65	N	9	10700	35	0.6	0.4	138	8	0.9	1	1	1	77	N	N	N	N	N	N	N	N
195	45	M	W2I2FI0	3	V	Y	N	N	N	N	N	N	N	IC	30	N	12.5	5160	13	0.8	N/A	111	N/A	1.2	1	1.1	1.3	63	N	N	N	N	N	N	N	N
196	68	M	W2I1FI1	3	V	Y	Y	N	Y	N	N	Y	N	IC	60	N	15	9800	26	1	1	79	13.1	0.9	0.9	1.2	1.1	71	N	N	N	N	N	N	N	N
197	64	M	W3I2FI1	4	VI	Y	N	N	N	N	N	Y	N	IC	50	N	10.8	13700	16	0.7	N/A	121	N/A	1	0.9	1	1.1	72	N	N	N	N	N	N	N	N
198	70	M	W2I2FI1	4	V	Y	Y	Y	N	N	N	N	N	IC	40	N	11.2	7890	19	1	0.3	79	6.8	1.2	0.7	0.8	0.9	89	N	N	N	N	N	N	N	N
199	46	M	W2I1FI1	3	V	Y	N	N	N	N	N	N	N	IC	30	N	13	9200	16	0.6	N/A	154	N/A	0.8	0.7	0.9	1	86	N	N	N	N	N	N	N	N
200	57	M	W2I3FI2	4	VI	Y	Y	N	N	N	N	N	N	IC	50	N	13.6	8790	23	0.8	0.2	106	6.9	1	0.8	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A	N	Y	1
201	65	M	W2I3FI2	4	VI	N	Y	N	N	N	N	Y	N	IC	30	N	12	16700	30	1.2	0.4	65	8	0.8	0.7	0.8	0.9	90	N	N	N	N	N	N	N	N
202	60	M	W2I2FI2	4	VI	Y	Y	Y	N	N	N	N	N	IC	50	N	14	12780	24	0.7	0.6	122	9	1	0.8	0.9	0.9	91	N	N	N	N	N	N	N	N
203	74	M	W1I2FI1	3	V	N	Y	Y	Y	N	N	N	N	IC	60	N	11.6	6370	15	1.3	0.4	57	6.6	1.2	1	1	1.1	70	N	N	N	N	N	N	N	N
204	78	F	W2I2FI1	3	V	Y	N	Y	N	N	N	N	N	IC	50	N	9.1	13100	24	1.2	N/A	46	N/A	1.4	1.2	1.1	0.9	64	N	N	N	N	N	N	N	N
205	53	F	W3I3FI2	4	V	N	Y	Y	Y	N	N	N	N	IC	80	N	11	8800	67	1.3	1.2	46	8.6	1.2	1.1	0.9	1.2	50	N	N	Y	3	N	N	N	N
206	82	M	W2I2FI2	4	V	N	Y	Y	Y	N	N	Y	N	IC	60	N	10.2	14000	29	0.7	0.2	115	9.1	0.9	1	1.1	1	76	N	N	N	N	N	N	N	N
207	63	M	W2I3FI1	4	V	Y	Y	N	Y	N	N	Y	N	IC	40	N	13.8	5980	29	1	0.9	80	10.5	1	1.3	1.2	1.1	72	N	N	N	N	N	N	N	N
208	60	M	W2I2FI1	3	V	N	Y	Y	N	N	N	N	N	IC	50	N	12	1200	35	1	0.4	90	8	1	1.2	N/A	N/A	N/A	N	N	Y	6	Y	3	N	N
209	57	F	W1I2FI1	2	VI	N	N	Y	N	N	N	N	N	IC	80	N	12.6	16000	12	0.8	N/A	79	N/A	1	0.7	0.9	0.9	69	N	N	N	N	N	N	N	N
210	69	F	WII0FI0	1	V	N	Y	Y	N	N	N	Y	N	IC	30	N	12	7700	50	1.4	0.14	40	5.3	2	1.4	1.7	1.3	43	Y	N	N	N	N	N	N	N
211	58	M	W2I3FI1	4	V	Y	Y	Y	N	N	N	Y	N	IC	50	N	10.6	13500	27	0.5	1.2	182	9.8	0.8	0.9	1	1.1	73	N	N	N	N	N	N	N	N