Introduction
The search of vascular substitute materials has been an endeavour over centuries. The initial failure of materials such as glass, ivory, silk, metal and nylon brought certain criteria into focus such as lack of thrombogenicity, infections, healing without immunologic reactions and durability. Research has therefore moved toward biomaterials. The aim of the present study is to present biomaterials and their applications in the area of vascular surgery.

Materials and Methods
Polyethylene terephthalate (PET, Dacron) and expanded polytetrafluorethylene (e-PTFE) are currently the standard biomaterials of prosthetic vascular grafts. These grafts are available in woven or knitted form. Various techniques are used to increase their applications: (a) Velour technique- to increase tissue incorporation or (b) Crimping technique- to increase kink-resistance, flexibility and distensibility. Furthermore, substances such as albumin, collagen or gelatine have also gained applications in the sealing of knitted grafts. The PTFE molecule is bio stable and not subjected to biological deterioration within the body. The surface is electronegative, which minimizes the reaction with blood components. Carbon coating is used to increase the surface eletronegativity so as to diminish thrombus formation. Heparin-bound e-PTFE grafts demonstrated reduced thrombogenicity and improved patency rates. Elastic polymers - Polyurethanes (PUs) have been introduced to create radially compliant vascular grafts. Transplantation of vascular allografts is an alternative to prosthetic grafts. Three different preservation methods are used: Cryopreservation, cold storage and glutaraldehyde preservation.

Results
Five-year patency rates are 93% for aortic bifurcation grafts made from Dacron, but only 43% for above-knee femoropopliteal bypass grafts, and lower for below knee grafts. A five year patency rate of 91% for e-PTFE grafts for aortic substitutes and 45% for femoropopliteal bypass grafting is reported in the literature. The 1 year cumulative primary patency of cryopreserved venous allografts ranged from 13%-79% and for cryopreserved arterial allografts 49%. The 1 year patency of cold stored venous allografts ranged from 63% to 80% and for glutaraldehyde preserved venous allografts, it ranged from 40-91%. Major complications are reported in 0-15%. Major limb loss occurred in 0-69% and graft disintegration (aneurysm formation or graft rupture) occurred in 0-15%.

The patency rates in e-PTFE and Dacron grafts are comparable, only marginal clinical improvement has been achieved from various modifications of the basic graft. Both grafts are relatively non-compliant. Because of compliance mismatch myointimal hyperplasia developed in the anastomotic regions. Vascular grafts made from PU do not improve the patency rates. Further PU grafts elongated with time after implantation, and the incidence of pseudointimal formation near the anastomosis was higher than that in e-PTFE. One major concern about PU grafts is the potential carcinogenic effect of its degradation products.

Discussion and Conclusions
E-PTFE and Dacron are the standard materials for large diameter vascular grafts. There is no ideal alternative to autologous vein grafts currently available for small diameter applications. Finding a solution for small-diameter bypass grafting has become a major focus of attention. The mid- to long-term failure of existing synthetic grafts is essentially caused by unfavourable healing process like incomplete endothelialisation and myointimal hyperplasia. Graft disintegration is a particular problem in allografts. So the preservation technique is important. It has been shown that glutaraldehyde molecule masks the histocompatibility antigen sits on vascular tissue, and it has been suggested that cryopreservation decreases the acceptor immunologic response against venous allografts. The ideal vascular graft should have a high graft patency rate, low graft disintegration rate, no need to immunosuppressive therapy, be available off the shelf in different length and diameters and be able to be stored for long periods.

References