# MICROORGANISMS ISOLATED FROM CATHETER TIP CULTURES: İBN-İ SİNA HOSPITAL 2002

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*SUMMARY*

*Semiquantitative and quantitative cultures of 282 catheter tips from patients hospitalized in different units in Ibni Sina Hospital showed significant growth in 57.1% and in 47.1% respectively by the two techniques. Highest positivity was found in catheters sent from surgery unit (85%) followed by reanimation unit (59.7%). Among the positive cultures coagulase negative staphylococci (60/161), S.aureus (35/161) and A.baumannii (28/161) were the most common isolates. Polimicrobial growth was 8%. High rate of culture positivity shows us the need of prospective detailed studies with clinical information of the patients and catheter types included in the study. Dialog should be established between Surgery unit and Central Laboratory since the number of catheters sent from surgery unit was very low (n:20) during one year period.*

***Key Words:*** *Intravascular Catheter, Semiquantitative Tip Culture, Quantitative Tip Culture, Colonization.*

*ÖZET*

***Kateter Ucu Kültürlerinde İzole Edilen Mikroorganizmalar: İbn-i Sina Hastanesi 2002***

*Ankara Tıp Fakültesi İbni Sina hastanesi çeşitli bölümlerinde yatan hastalardan alınan 282 kateter ucu semikantitatif ve kantitatif kültürlerle değerlendirilmiştir. Bu iki teknikle sırayısıyla %57.1 ve %47.1 üreme saptanmıştır. En fazla üreme Genel Cerrahi kliniğinden (%85) gelen kateterlerde olmuş, bunu reanimasyon ünitesi (%59.7) izlemiştir. Pozitif kültürlerde koagülaz negatif stafilokok (60/161), S. aureus (35/161) ve A. baumanii (28/161) en sık rastlanan etkenler olmuştur. Yüzde 8 oranda polimikrobial üreme görülmüştür. Kültürde üreme oranlarının bu kadar yüksek olması hastaların klinik bilgilerini ve kateter tiplerini içine alan ayrıntılı prospektif çalışmalara ihtiyaç olduğunu göstermektedir. Genel Cerrahi kiliniğinden gelen kateter miktarının düşük olması (n:20) Merkez Laboratuvarı ile Genel Cerrahi kliniğinin daha yakın ilişkide olması gerekliliğini göstermektedir.*

***Anahtar Kelimeler****: İntravasküler Kateter, Semikantitatif Kateter Kültürü, Kantitatif Kateter Kültürü, Kolonizasyon.*

Localised or systemic infections are frequent complications associated with extensive use of foreign devices in modern medicine. Intravascular catheters are one of the most widely used devices in multidisciplinary medical practice. Infections of these catheters not only cause high expences due to loss of the catheters but may cause bacteremia and sepsis with high mortality as well. Many efforts have been applied both for prevention and management of such infections. The agent responsible from colonisation and infection is important for the therapeutic approach for the choice of antibiotic therapy and decision of the catheter removal (1,2,3). Every medical center has its own patient and medical care groups and medical behaviour that will affect microbial flora and it should be closely monitored by the microbiology laboratory to decide on the preventive actions and empirical antimicrobial choices.

The aim of this study is to show the microbial spectrum and rate of colonisation/infection in different intravascular catheters used in different units in İbni Sina Hospital.

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## Method

Tips of the intravenous catheters obtained from hospitalized patients sent to the Central Diagnostic Laboratory of İbni Sina Hospital were cultured using semiquantitative tip culture method followed by quantitative technique. Semiquantitative tip culture method is the classical roll plate method described by Maki. For quantitative technique 5-7 cm catheter tip is put in 1 ml of brain heart infusion broth and vortexed for 10 minutes. 100 mcg of broth is poured on to blood and chocolate agar plates. After 24 and 48 hours all of the plates were evaluated for growth of microorganisms. >15 cfu and >1000 cfu/ml respectively were considered as positive according to the protocols (4,5).

Identification of bacteria are performed by classical microbiological techniques and mini API (bioMerieux) system where necessary (6).

## Results

During 1.1.2002 and 31.12.2002 a total of 282 catheter tips sent to the Central Laboratory from different wards were evaluated. 121 (42.9%) of them were sterile. The results were compatible in 133 catheters but 28 (Staphylococcus spp 17, gram negative bacilli 7, streptococcus spp 1, Candida albicans 1, diptheroids 2) were found positive only by semiquantitative technique. The highest isolation rate was found in surgery unit (85%). The services and the culture positivity results are shown in Table 1. Single microorganism was observed in all but 13 (8%). Types of the microorganisms observed in mixed growth is shown in Table 2. Coagulase negative staphylococci, S.aureus and A.baumanni were the most common isolates respectively baumannii (Table 3). Seventy percent of gram negative bacilli were mostly seen in the reanimation unit. Among the 5

*Table 1: Distribution and positivity among the catheters due to the wards*

| Unit | No of Catheters | Positive cultures | Colonisation/infection rate |
|---|---|---|---|
| **Reanimation** | 139 | 83 | 59.7 |
| **Internal medicine*** | 123 | 61 | 49.5 |
| **Surgery** | 20 | 17 | 85 |
| **Total** | 282 | 161 | 57.1 |

*62 catheters are from the haematology unit .

*Table 2: Mixed growth of microorganisms and their origin*

| | Unit | Bacteria 1 | Bacteria 2 |
|---|---|---|---|
| 1 | Reanimation | S.aureus | A.baumannii |
| 2 | Reanimation | P.aeruginosa | CNS |
| 3 | Reanimation | K.pneumoniae | CNS(S.epidermidis) |
| 4 | Reanimation | K.pneumoniae | S.aureus |
| 5 | Reanimation | S.aureus | Enterobacter cloacae |
| 6 | Reanimation | Enterobacter cloacae | P.aeruginosa |
| 7 | Reanimation | A.baumannii | S.maltophilia |
| 8 | Reanimation | A.baumannii | P.aeruginosa |
| 9 | Reanimation | A.baumannii | E.coli |
| 0 | Reanimation | A.baumannii | Citrobacter freundii |
| 11 | Gastroenterology | S.aureus | CNS (S.epidermidis) |
| 12 | General Surgery | S.aureus | Gram neg. bacilli |
| 13 | Haematology | Candida dublinensis | A.baumannii |

***Table 3.*** *Microorganisms isolated ( semiquantitative technique)*

| Microorganisms | n | % of total isolates |
|---|---|---|
| Gram positive cocci | 104 | 59.7 |
| Staphylococcus aureus | 35 | |
| Coagulase negative staphylococci | 60 | |
| Micrococcus luteus | 3 | |
| Enterococcus spp | 5 | |
| Streptococcus spp | 1 | |
| Gram positive bacilli | 5 | 2.9 |
| Corynebacterium spp | 1 | |
| Diphteroids | 4 | |
| Gram negative ( fermentative ) | 18 | 10.3 |
| Escherichia coli | 7 | |
| Klebsiella pneumoniae | 4 | |
| Klebsiella oxytoca | 1 | |
| Enterobacter spp. | 5 | |
| Citrobacter freundii | 1 | |
| Gram negative ( non –fermentative) | 43 | 24.7 |
| Acinetobacter baumannii | 28 | |
| Stenotrophomonas maltophilia | 3 | |
| Pseudomonas aeruginosa | 8 | |
| Nonfermentative gram negative bacilli | 4 | |
| Candida spp | 4 | 2.3 |
| Candida albicans | 1 | |
| Non albicans | 3 | |
| Total | | 174 |

Candida species 2 were C.albicans, one was C.dublinensis and 2 were nontypable.

## Discussion

The high incidence of bacteriemia by extensive use of intravascular devices caused special interest in the microbiology and pathogenesis of catheter related infections. Once catheter infection is decided the therapeutic approach will be affected by the severity and the type of infection, status of the patient and the necessity of the catheter and the type of the etiologic agent (7,8,9). The spectrum of microorganisms should be known to decide about the route of infection and to take preventive measures and to decide empirical antibioitic therapy. Vascular catheter infections can develop for many reasons but they must begin with catheter colonisation by microorganisms through either one or both of two routes; colonisation of the outside catheter by either skin microorganisms or hematogenous seeding from a distant site, colonisation of inside of the catheter by the introduction of microorganisms through catheter hub or contamination of infusion fluid (10,11). Early catheter infections are caused primarily by skin microorganisms, and late infections by catheter lumen or hub contamination. Depending on studies the two most common microorganisms involved in catheter colonisation and/or infection are S.epidermidis and S.aureus (12,13). S.epidermidis has the ability to survive in the presence of a foreign body. Adhesin and pili like structures were shown to play role in adherence. Slime production is another virulence factor in S.epidermidis. Demonstration of S.aureus with enhanced virulence in the presence of a foreign body has been shown. It has the ability to adhere surface proteins and form glycocalyx which may help them evade phagocytosis (14,15). In our study CNS and S.aureus were the two most common isolates. Gram negative bacilli and particularly A.baumannii was the third common isolate in our study. For years intravascular devices as source of nosocomial gram negative bacteremia has been undefined. Though less often implicated than gram positive microorganisms, gram negative bacilli particularly the enterobacteriaceae members, P.aeruginosa and Acinetobacter spp. account for up to one-third of infections associated with most intravascular devices.(16,17) Mortality of bacteremia due to Pseudomonas aeruginosa is reported to be high however it is believed to be lower in catheter related bloodstream infections (18) Unlike gram positives, pathogenesis of gram negative bacteria in catheter infections has been rarely investigated. Particularly the nonfermentatives live well in moist environments and live in contaminated infusions. P.aeruginosa and Acinetobacter spp. may have spesific adherence properties and

biofilm formation. Our high isolation rate is probably due to our high number of catheter tips sent from the reanimation unit where A.baumannii is a frequent colonizer. Gram negatives may colonize the intravascular catheters in the same manner as common gram positives which are present in human skin (19). In our report Stenotrophomonas maltophilia (one from reanimation unit and 2 from nephrology unit) is remarkable. It may alarm us for the introduction of a new nonfermentative gram negative in catheter related infections. The overall incidence of Candida infections due to intavascular devices has been increased, but our isolation rate is less than that of the similar studies. In the literature, colonization rates between 5%-27% are mentioned (20,21).

Our data showed significant growth in more than 50% of catheters included in the study. With the clinical informations of the patients, catheter related infection and septicemia rates in our hospital must be established. During one year period only 20 tip cultures from surgery units is questionable. Importance of clinical microbiology laboratory in the diagnosis of catheter related infections should be emphasized to the surgeons.

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